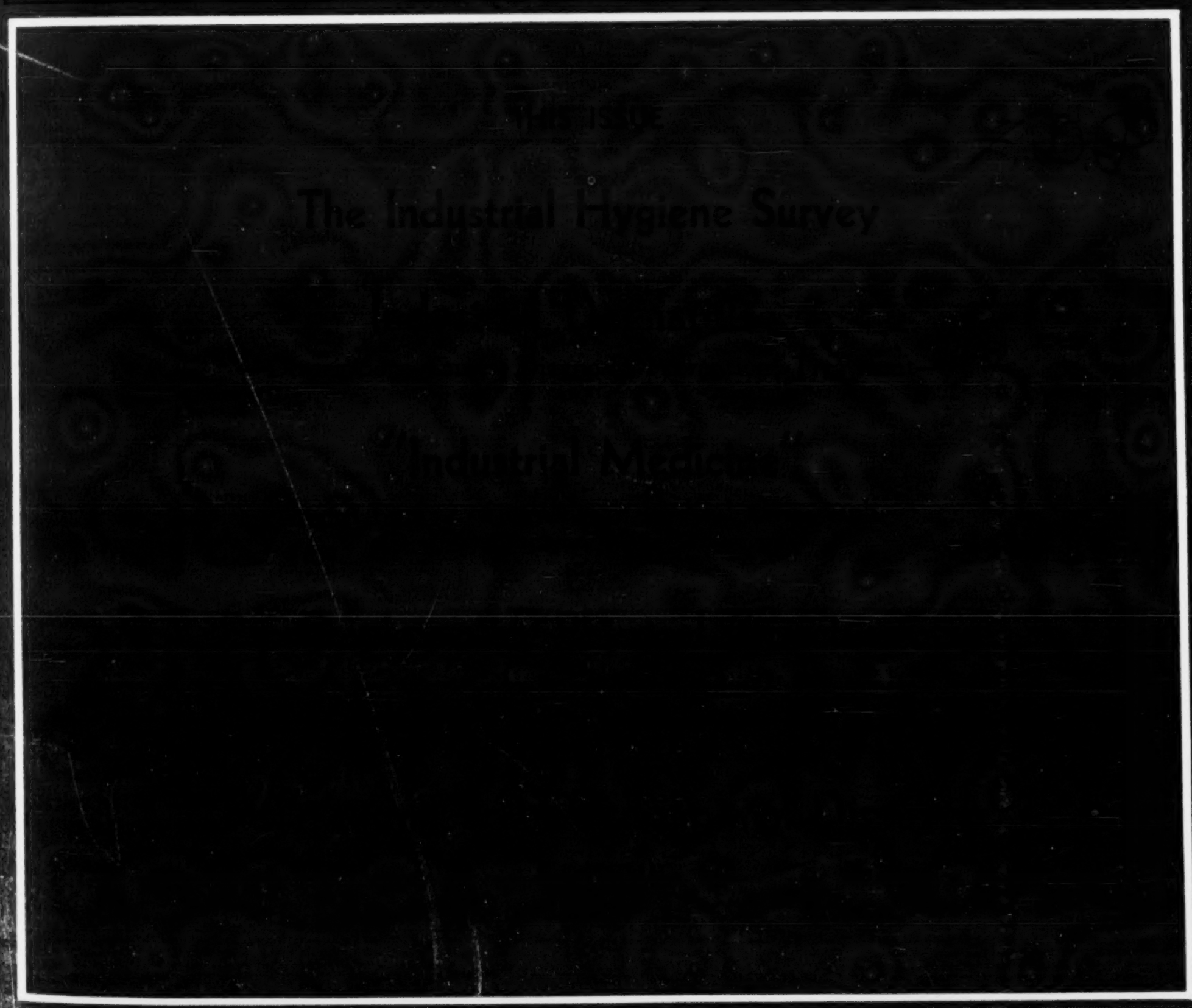
# Industrial Medicine

for

Physicians and Surgeons in Industry



# The Pneumonokonioses (Sil

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### --- from 1556 to December 31, 1933 ---

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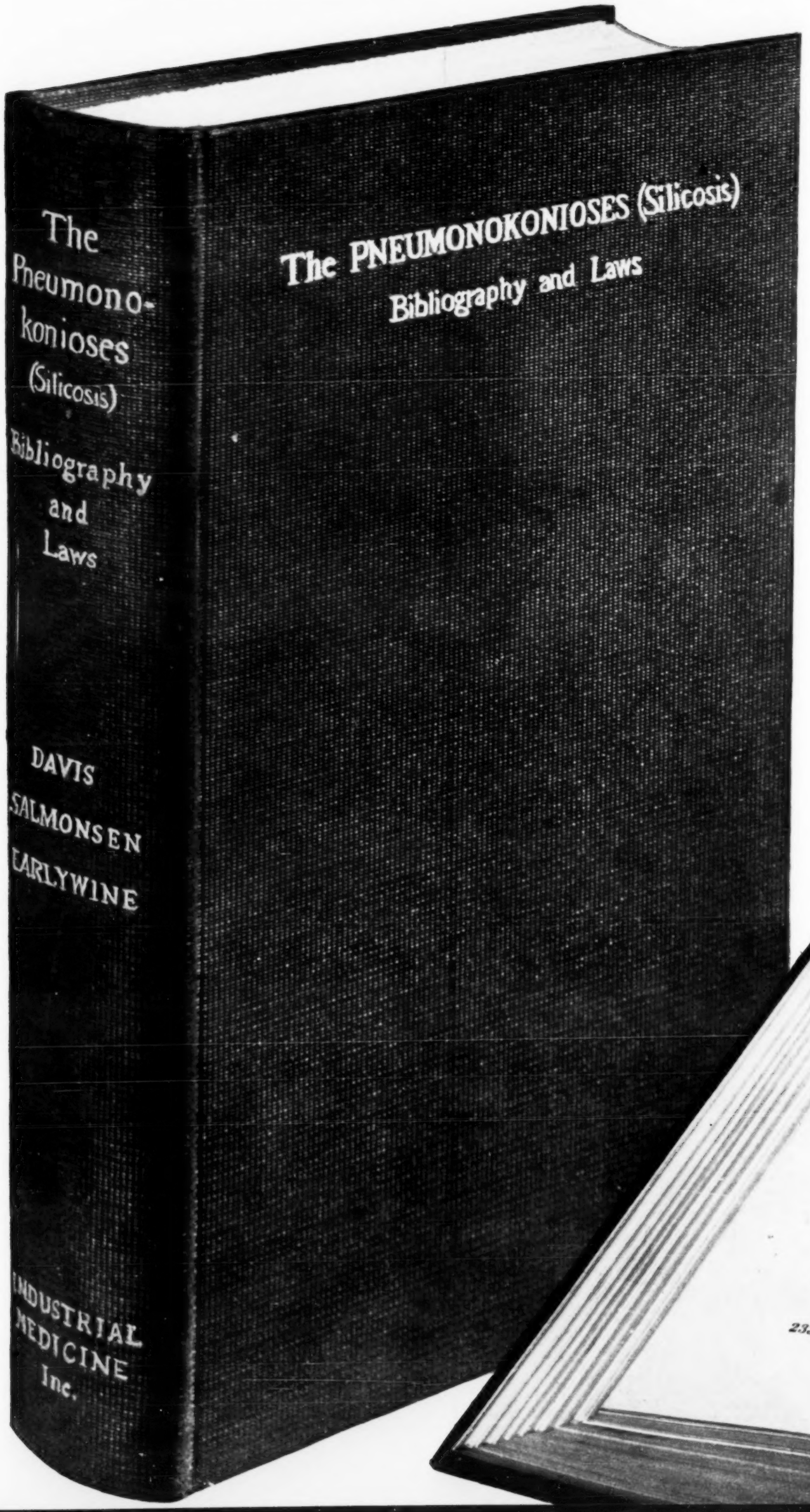


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**Industrial Medicine**

**844 Rush Street**
**Chicago, Illinois.**

*"Wherefore to these the Fates shall bend*
*(And all old idle things—)*
*Wherefore on these shall Power attend*
*Beyond the grip of kings:*
*Each in his place, by right, not grace,*
*Shall rule his heritage—*
*The men who simply do the work*
*For which they draw the wage.*
*Not such as scorn the loitering street,*
*Or waste to earn its praise,*

# Industrial Medicine

Reg. U. S. Pat. Off.

*Their noontide's unreturning heat*
*About their morning ways;*
*But such as dower each mortgaged hour*
*Alike with clean courage—*
*Even the men who do the work*
*For which they draw the wage—*
*Men, like to Gods, that do the work*
*For which they draw the wage—*
*Begin—continue—close that work*
*For which they draw the wage!"*
—KIPLING

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# The Industrial Hygiene Survey

*by*

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THE day has now come when industrial management is attaching to occupational disease hazards and industrial hygiene in general, significance more nearly commensurate with the part played by such matters in industrial activities. For more than a score of years a disproportionate interest and action have been thrown around industrial safety, medical relief and physical examinations, with only a scant and usually a haphazard consideration for occupational disease hazards, plant sanitation and worker hygiene.

Experience may be the best teacher, but it is also the most expensive one. Developments resulting from hazardous work conditions have been highly expensive to many scores of industries in the past five years. These organizations have paid out many thousands of dollars in judgments to successful claimants, in the combating of various types of claims, and in the liquidation of claims without legal action. A few organizations, heretofore successful, have been forced into actual bankruptcy due to the onslaught made by claimants predicated upon harmful work conditions. So numerous have been the law suits and other unhappy experiences that industry everywhere has been made alert to at least the possibilities that what has happened to a few score industries might easily be its own lot. A complete change of attitude is being encountered with respect to legal compensation for occupational diseases. Heretofore in many states there has existed a hidebound feeling of hostility against any such provision. However, when juries, making decisions under common law actions, provide generous awards for almost every worker claiming injury arising from unhygienic work conditions, these same heretofore hostile industrialists are among the first to demand legal occupational disease compensation, and to interrogate themselves as to just what may be going on in their own individual plants that might be a source of contention. In short, there are many valid evidences of apprehension on the part of the manufacturer that work conditions prevailing in his plant may fall short of those regarded as commendable and proper. Unfortunately these manufacturers find themselves confronted with difficulties in ascertaining the true status of their plants as possible sources of varied occupational diseases, claims, and law suits. Medical departments, however capable in applying medical relief, performing physical examinations and taking care of other matters commonly in their domain, are in many instances proving insufficiently acquainted with preventive measures to marshal a full measure of facts necessary for the guidance of the management in the procurement of controlling devices and practices.

In the same category fall the services of the usual plant engineering staff.

Granting an abundance of capacity for the customary engineering problems attending manufacture, rarely are these plant engineers competent to ferret out the requirements of special devices needed in coping with many types of industrial hygienic problems.

As a general result many hundreds of industries the country over are learning for the first time that they possess no adequate or complete information as to the nature and extent of hazards to the health of workers, bound up in the trade processes being utilized. These manufacturers recognize the need for complete industrial hygiene surveys, but only vaguely are they acquainted with the mechanism of such surveys, the gains to be derived from them, and the qualifications required of those making such studies. The industrial hygiene survey is here presented as the tool most effective at this immediate time in acquainting industries with their shortcomings in worker health conservation.

## What is An Industrial Hygiene Survey?

AN INDUSTRIAL hygiene survey is a complete and adequate investigation of the entire premises of industrial operations (including materials, products, by-products, processes, records, and at times workers), for the purpose of establishing: (1) the nature and extent of all harmful working conditions conducive to abnormal functioning of the minds and bodies of exposed employees, ex-

cluding, however, hazards to accidental injury or illness of any nature not related to work as a cause; (2) the incidence of demonstrable injury that already has involved exposed workers, and (3) the devices and practices best adapted to the prevention of further harmful effects from any and all health damaging agencies. The industrial hygiene survey necessarily is carried out on the industrial premises and, at its best, by persons technically qualified and experienced to recognize and fully to interpret the significance of observations and tests made.

The industrial hygiene survey chiefly centers about such industrially encountered substances and conditions as dusts, gases, vapors, mists, toxic chemicals, harmful rays, heat, fatigue, postural hazards, noise, vibration, lighting, abnormal atmospheric conditions, such as excessively high or low temperatures, excessively high or low humidity, marked pressure variations, etc. In short, the environment in industry in which workers carry out their duties is commonly very different from the environment to be accepted as the optimum for the proper functioning of the human body and human mind. It is the general purpose of the industrial hygiene survey to bring to light evidences of marked deviations from this best environment, and to establish ways and means for the elimination or the amelioration of every possible abnormal factor in the work environment unfavorable to the sustained health and prolonged life of all workers.

### Why Should The Industrial Hygiene Survey Be Made?

INDUSTRIAL management foremostly is concerned with turning out its products under conditions assuring the perpetuation of the organization and the making of adequate returns to the organization's stockholders. Executives in industry as a rule are illy informed as to the possible action of scores of different chemicals, liquids, dusts, gases, etc., that may be utilized or produced on the plant's premises, in terms of their effects upon workers who find themselves in contact with such substances. Recent experience in connection with suits or other claims has nearly always brought out the fact of the almost complete lack of knowledge by anyone in the managerial group that such conditions existed or that the extent of harm that conclusively did arise, might have arisen. Very astute executives vividly in touch with production matters are woefully given to developing their concern in health hazards only after the harm has taken place. Using silicosis as an example, it may be pointed out that scores of industries have carried out their operations under conditions during the past 25 years without a single thought as to the possibility of direful harm resulting from the exposure of workers to silica dust. As a result some of these industries necessarily will spend the next 25 years in making substantial payments to groups of workers who will serve as a constant reminder of the unfamiliarity of industry with its health hazards. The usual industrial physician, with some notable exceptions, is by training, experience, interest and pressure of routine duties, unqualified to serve as the investigator of work conditions as to health hazards or to interpret to the management the significance of such matters. Recently, prior to the institution of an industrial hygiene survey, those persons entrusted with this work wrote to the plant management and to the medical department seeking advance information as to its possible health hazards. In a spirit of complete cooperation the medical department made reply that knowledge of only two hazards existed. Later when the actual survey was made, additional hazards to the total number of 92 were detected. Moreover, examination of the hospital records for the preceding 10 years established the actual occurrence of numbers of cases of genuine occupational diseases which in error had been earlier diagnosed as non-occupational affections.

The management of the average industrial plant is prone to believe that it is substantially free from occupational disease hazards. To the contrary, it is the experience of industrial hygienists that rarely is a plant free from practical dangers of this character. Usually the number is to be reckoned in dozens rather than in twos or threes. Nearly always conclusive proof may be adduced showing not only that hazards exist but also that cases of corresponding affections may be traced to these hazards. The trained industrial hygienist may pass through the same areas in a plant traversed daily by safety inspectors, physicians, executives and others whose attention has been attracted by no unfavorable conditions, and with his seeing eyes or his testing equipment spot or detect decidedly unfavorable work conditions. Recently one industrial hygienist in the carrying out of a survey was advised by the executive accompanying him that it was quite unnecessary to pass through the shipping department. The industrial hygienist suggested that the trip be made anyhow, and in this one small department found that the much used stencil ink was diluted with nitrobenzol, that the articles packed for shipment were given a final cleaning in the open with carbon tetrachloride, and that the liquid used by workers for the cleaning of hands at the end of the work day was highly conducive to a dermatitis.

The real reason for the carrying out of industrial hygiene surveys resides in the fact that under ordinary circumstances both the management and the medical department have, through long contact with working conditions throughout the plant, unconsciously educated themselves to believe that no hazards prevail, that no disease states arise, and that few untoward results may be anticipated from any portion of the plant's premises.

### What Will The Industrial Hygiene Survey Reveal?

AT ITS best the industrial hygiene survey is carried out by a trained personnel (a) directly on the premises, (b) spending an adequate amount of time on the project, represented ordinarily by weeks or months rather than by hours or weeks, (c) having full access to every portion of the plant's activities, operations, past experiences, medical records, etc., (d) performing extensive and varied tests with apparatus of proved efficiency.

Such investigators working under these assumed conditions may in due time be expected to place in the hands of the management suitable confidential records furnishing many types of usable information based upon the prosecution of a program of many objectives, among which are these:

1. To procure adequate information relative to all substances used in the plant under study

and all trade practices carried out in the plant that might lead to health impairment of workers.

2. To discriminate between theoretical and practical hazards to the end that the management thoroughly may be apprized of the extent of the practical dangers to occupational diseases in the plant.
3. To determine the frequency with which actual occurrences of occupational diseases are now arising and have arisen in the past, and to discern the different varieties thereof.
4. To seek out conditions of work incapable of producing characteristic occupational diseases but which, no less, may prove to be causes of impaired physiologic functioning of exposed workers.
5. To discover the nature and range of protective appliances already in use in the plant that were designed for protection against industrial workers.
6. To measure and appraise the extent of efficiency of these varied protective devices, appliances, etc.
7. To establish the needs for new devices, equipment, practices, etc., for additional protection of exposed workers in the plant.
8. To ascertain the adequacy of servicing and maintenance of these various forms of protective equipment and measures in order that they may function at their highest efficiency.
9. To indicate sources of apparatus, appliances, devices, etc., of the best types suited to the requirements of the plant under study.
10. To appraise the services of various personnel departments, such as the medical department, in terms of the sufficiencies of their endeavors in coping with the problems centering about divers industrial hygienic hazards, plant sanitation, occupational diseases, etc.
11. To create a program for future activities suited to the control of all possible hazards to impaired health of workers in the plant.
12. To estimate necessary personnel and the qualifications thereof, requisite to the application of a practical program of future action.
13. To prepare such reports with charts, tables, photographs, and other items as are necessary to carry conviction to the management of the plant as to the actuality of objectionable conditions and the needs for betterment.

### How Is the Industrial Hygiene Survey Made?

TO MANY persons it might seem to be an elaboration of the obvious here to include any recital of the method of approach of the industrial hygienists to the possible problems that might exist in any given plant. On the contrary one of the most frequently asked questions by industrialists of industrial hygienists is: "How will you go about the making of such a survey?"

For this reason those points of outstanding import to the industrial hygienist here are listed:

1. It is desirable that the industrial hygienists be furnished with a complete list, and samples, of all raw materials entering the plant for any purpose, either for production, maintenance or service. Further, this list of samples should include intermediate stages of all products together with finished products. In some plants such a list will aggregate several thousand items. In the average large plant such raw and intermediate materials, together with products, will approximate 100. In turn, the industrial hygienist should appraise every single item in terms of possibilities of harm being brought about by contact with these several substances. Eventually a record will be created by the industrial hygienist earmarking every substance used in the plant in question that has, through experience, been known to cause harm in this particular plant, in this type of plant, or in other industries.
2. In due time the industrial hygienists should establish the point or points in the plant at which these harmful substances are utilized, the by-products of their use, such as the creation of dust, gases, vapors, etc.
3. Careful inspections should be made of the entire premises prior to the institution of any actual testing and for the purposes of determining the type and number of tests to be made. Such inspections ordinarily will lead to the decision as to the necessity of dust counts, petrographic analyses, chemical analyses, vapor determinations, gas measurements, illumination tests, noise measurements, audiometer tests, tests for vibration, clinical laboratory examinations, special forms of laboratory examinations, x-ray examinations, etc.
4. After these first hand inspections all tests regarded as necessary should be applied. Ordinarily appraisals as to the extent of practical hazards are based upon findings from properly made test procedures of divers types.
5. Early in the survey the records of the medical and safety departments should be studied in the quest for leads to harmful substances, hazardous departments, and departments that furnish disproportionate percentages of medical cases, high labor turnover, excessive absenteeism, or worker complaints. Such information as accrues should lead to appropriate investigation as to their significance.
6. Conferences should be arranged with key persons in the plant likely to possess information bearing upon health hazards. This group of persons should include plant physicians, safety engineers, works managers, compensation adjusters, industrial nurses, foremen, and others.
7. An essential part of the survey is to be found in a study of the literature based upon investigations in similar plants or dealing with occupational diseases similar to those encountered in the plant under study.
8. It is most helpful to photograph for purposes of record undesirable conditions as detected. These photographic records serve useful purposes for comparisons when remedial measures have been installed.
9. The mere demonstration of the use of harmful substances, or of the formation of harmful substances as products, by-products or waste products, or proof that such agents

constitute practical hazards and have led to actual cases, is not sufficient. Those persons carrying out the survey should provide recommendations as to suitable protection measures,—the substitution whenever possible of harmless substances for harmful ones now in use, the institution of the wearing of safeguarding devices, the need for engineering equipment, such as dust collectors, exhaust systems, enclosed systems, wet methods, etc. The chief worth of the survey is to be found not merely in condemnation but in the furnishing of constructive guidance promising elimination of the hazards or the bringing of the hazards under control.

10. Wherever workmen are known to suffer from the effects of occupational health hazards it is the obligation of those carrying out the survey to indicate the best known procedures for the cure of these affections, the prevention of reoccurrences, the readjustment of these afflicted workers to industry, transfers to other departments, etc.
11. In many instances, but not inevitably so, the industrial hygiene survey should take cognizance of legal situations, violations of local state or federal regulations. In many plants, violations of legal provisions continually take place without any knowledge of plant officials as to such violations. This represents no viciousness on the part of the management or unwillingness to carry out such requirements. It merely constitutes a lack of familiarity with existing regulations. It is properly within the realm of the industrial hygienist to set forth in the record of the survey necessary changes to be made in order to fulfill the requirements of legal statutes or practices. At times legally imposed devices fail to provide full protection against hazards and occasionally are without any value whatever.
12. The entire findings of the survey should be brought together in a non-technical, fully interpreted report in which there are set forth full knowledge of existing hazards, the extent to which they are practical, the extent to which harm has already been brought about, the trend of protective requirements, together with all other available information portraying to the management the true picture of work conditions with respect to health hazards and the need for the management to right these wrongs.

### Who Should Make The Industrial Hygiene Survey?

THE field of need for the industrial hygiene survey is by no means exclusively within the domain of the engineer or the physician or the chemist or the toxicologist. In the usual large plant, situations arise calling for services of highly developed workers in all of these mentioned provinces.

Much industrial hygiene work is performed by engineers with special qualifications as industrial hygienists. Under such circumstances the survey may assume a disproportionate lack of balance toward the side of engineering. When, on the other hand, the survey is made by the physician versed in industrial hygiene the entire work may take on an equally disproportionate trend toward the medical aspects of the problems encountered. In neither case is the information that may be placed in the hands of the management as complete as might be desired. Under optimum conditions this work should be performed by some person highly developed in medicine, engineering, chemistry, toxicology and industrial hygiene. It is scarcely believable that such persons exist. This being true, it becomes obvious that the most beneficial industrial hygiene survey will be made by both engineers and physicians, fully cooperating together with the necessary auxiliary services from the chemist, the toxicologist, and other special workers. It is a bit incongruous to observe highly skilled engineers presenting the signs, symptoms, pathology and x-rays of some occupational disease, for which procedure they are qualified only by having learned these matters through rote.

It is equally inept that physicians should essay the role of the engineer in figuring out the technical requirements of ventilating systems, or to undertake to design various devices calling for the services of highly skilled specialized engineers.

One of the great tragedies that has grown up around the development of industrial hygienic work centers about the dependence of plant management upon its own engineering staff to conceive, design, create and install appliances intended for worker protection in hazardous operation when these engineers are in no wise qualified to undertake such steps. Millions of dollars have been wasted in industry through this brand of industrial hygiene. When these appliances fail to control existing problems management ordinarily fails to realize the inadequacy of its own engineering staff in this special field of operation, even though these same engineers may be exceptionally well qualified for the particular type of engineering services for which they are normally utilized in the organization.

One of the unhappy duties of the highly skilled ventilating engineer is sadly to point out the worthlessness of many ventilating and exhaust systems found in industry, and to indicate that the amount of money already spent to useless purposes would have been adequate to the installation of truly suited mechanism fully capable of overcoming existing hazards.

### The Universal Need for the Industrial Hygiene Survey

NINE out of 10 of the larger industries may be shown to harbor a fair number of opportunities for the acquisition on the part of the workmen of some abnormalities of body or mind, or both.

This statement does not necessarily imply that in all instances these conditions may be proved beyond peradventure by the examining physician.

While many scores of characteristic and diagnosable occupational diseases do exist, in the aggregate, a greater quantity of impairment results from the vague and somewhat insidious effects of extremes in temperatures, atmospheric abnormalities, fatigue-producing agencies, noise, postural hazards, harmful chemical rays, etc. As a slowly produced result the total work span of industrial employees may be appreciably curtailed, the com-

ing of degenerative diseases is accelerated, and the capacity for sustained work on the level of the early decades tends to disappear in middle-aged decades.

No single one of these unwanted circumstances is absolutely necessary and conceivably might wholly be avoided through due and proper consideration for the human organism and its work environment.

Scattered over the country, a fair number of industrial organizations, through intelligent foresight and experience, already have instituted procedures, practices and devices sufficient to the complete protection of workers, and already have brought substantially all health hazards under control.

No very precise figures are available, but it appears reasonable to believe that the number of organizations that have already faced their industrial hygienic problems and procured adequate remedial measures is not more than 5% of the total.

The remaining 95% may be regarded as distinctly in need of far reaching appraisals as to the worth of appliances and practices already in use, and a detection of unknown or little known remaining hazards illy operating to the interest either of the worker or the employer. Recent painful experiences in many industries emphasize the need for enlarged bodies of information for the guidance of industry in the solution of its industrial hygienic problems.

### The Industrial Hygiene Survey, and the Future Industrial Hygiene Program In The Plant Studied

PRIMARILY the industrial hygiene survey is an instrument of diagnosis rather than one of cure. It is quite possible that competent industrial hygienists faithfully might make a prolonged study in a given plant, might detect and describe all possible hazards, delineate suitable protective devices, prepare a comprehensive program for future work, render to the management a well written report covering all aspects of the observations made, and finally depart from the plant's premises—all without there having been brought about any single items of changed conditions achieving the abatement of a single hazard. To submit the survey report usually marks the beginning and not the end of remedial measures necessary for the elimination of the plant's hazards. Every survey presupposes that it is to be followed up by many types of activities which in due course will bring about the results contemplated in the survey itself. An intregral portion of the report as submitted should be devoted to a well devised "Program of Future Activities".

The application of the industrial hygiene program ordinarily falls to the lot of the regular personnel of the plant. At times the volume of new work created by conditions described by the survey necessitates the employment of additional personnel.

In some plants that have procured surveys the report has been turned over by the management to some one executive with authority and instruction to set in motion and maintain the application of the recommendations appearing in the report.

This had led to the delegation on the part of this executive of various recommendations to the engineering department, the safety department, the medical department, etc. Inevitably the report will embrace many recommendations, department by department. Certain work areas may require the wearing of respirators; certain hot departments may call for the use of salinized drinking water to replace chloride losses through perspiration; certain recommendations may refer to the need for routine dust counts; still another group of recommendations may be concerned with the need for various types of clinical laboratory examinations; work conditions in dusty departments might occasion a recommendation as to x-ray examination; almost inescapably some recommendations will refer to the design and installation of dust collecting systems, air conditioning appliances, etc.

On and on through a long category, specimen recommendations might be cited as examples of the content of a program of future activities growing out of a comprehensive survey. Already sufficient has been included to emphasize the fact that if full benefit is to be derived from a survey, every effort should be made to bring into actual being every practical recommendation made by the surveying group.

The industrial hygiene survey, properly conducted, is at this time the most promising source of reliable information as to existing hazardous work conditions in industry, the availability of which information should serve as a guide to industry in the formation of future programs of health conservation for workers.

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## The Common Cold

BROWNING, in his summary of the causation of the common cold*, states that: (1) The common cold is, at least in some instances, due to an agent which is not habitually harbored by those attacked. This is proved by the outbreak of epidemics in isolated communities on the occasion of the first visit of strangers after an interval of no communication. (2) Evidence that an infective agent of the filter passing type is responsible is furnished by the transmission of colds to quarantined human subjects and chimpanzees by the intranasal installation of sterile filtrates of the nasal secretions of persons in the early stage of colds. The causal agent can survive for a considerable period outside the body and is capable of proliferation in culture medium in vitro. (3) It is not determined whether the ordinary pathogenic bacteria which may occur in the upper respiratory tract are ever by themselves the causal agent of coryza, although there is no doubt that as superadded infections they are important in aggravating the condition, and especially in bringing about complications. (4) The incidence of colds is to a great extent independent of climate but has some relation to weather. Thus, a sudden fall in temperature tends to be followed by an outbreak, owing in all probability to a lowering of resistance of the tissues. Nothing is known regarding factors that may influence the virulence of the casual agents. (5) There is little or no evidence that the incidence of colds in a community is related to the general habits of living of its individual members.

* *Glasgow Med. J.* (June, 1935); Abstr. *J.A.M.A.* (August 17, 1935).

# Industrial Dermatitis

*—Description; Causes; Diagnosis; Prevention; Treatment—*

*by*

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ALTHOUGH the relationship of industrial diseases to occupation has been recognized since the time of Hippocrates, no attempt at a scientific study of the causes, dangers and treatment of industrial diseases was made until 1700, when the Italian physician Ramazzini made his excellent observations on 43 different occupations.

A considerable amount of study has since been devoted to these problems, and the hazards and evil consequences attending the various industries have been recognized. In order to care for the injured and control the sources of injury, compensation laws were introduced, first in England and Germany. The first workmen's compensation act in England was passed in 1899. The first compensation acts in this country were passed by Congress in 1908, 1911, and 1912 to compensate certain government employees. Various states then followed the example set by the government, and at present 11 states have occupational disease compensation laws.

These laws, however, are not uniform; some cover all diseases arising in the course of employment, while others specify the compensable condition. For example, in New York State, only specified skin diseases are on the compensation schedule.

The Workmen's Compensation Law of the State of New York was invoked in 1913 for the purpose of compensating injured employees or their families for disabilities sustained or death incurred from occupational diseases. The law enumerates in two columns, 1: the diseases that are covered, and 2: the processes involved in the production of the diseases. This law has become a most important factor in our social, economic and industrial life.

The original wording has been gradually supplemented by the insertion of new paragraphs to include diseases that were recognized as being etiologically related to certain occupations. As the law stands today, of the 27 specific paragraphs, the dermatologist is directly concerned with 21. Among the remaining six, it is also possible to interpret two others, the 21st and 22nd, so as to include skin manifestations occurring from poisoning due to methyl chloride and carbon monoxide. On September 1, 1934, a new addition was made to the law, stating that use or direct contact with brick, cement, lime, concrete and mortar are additional compensable causes of dermatitis.

Unfortunately, only a small percentage of physicians knew of this law. In this past few years they have become more familiar with it, and possibly because of the general economic and social revolution, as well as recognition of the enormous strides made in industrial medicine, they are participating more actively in the general movement.

Skin diseases constitute more than 50% of all compensation cases in this country. As it is impossible to discuss all of these in a single paper, it is intended to describe here the most common — industrial dermatitis.

It has been estimated that more than half of all claims for compensation due to industrial skin diseases are concerned with dermatitis. The actual percentage would probably be even higher, and more accurate, if the many cases of short duration and those not reported to employers because of fear of dismissal would be taken into account.

### Clinical and Microscopic Picture

THE skin is the most exposed organ of the body. The protective and other physiological functions of the skin cooperate harmoniously in health with those of other organs of the body. Visible changes of the skin may, therefore, be caused by external agents and by internal disturbances of the rest of the body.

The most common occupational skin disease is dermatitis. It may be defined as an inflammation of the skin that is characterized by the presence of certain signs and symptoms. There are numerous types of the condition, and numerous classifications of the condition are described. The most practical and acceptable is that indicating the causal agents.

To aid in the intelligent comprehension of the significance of visible lesions, I intend briefly to describe the microscopic changes that occur in the cutaneous structure when it reacts to an irritant.

If a piece of inflamed skin is excised and then stained with dyes, it is found that there is first a dilatation of the blood vessels resulting in the presence of more blood, thus explaining the redness and heat. If another piece is examined when the reaction is more intense, it will be observed that, associated with the widening of the blood vessels, there are blood cells and serum present outside and in the neighborhood of the blood vessels. Nearer the surface, the epidermal cells appear enlarged, swollen, contain more fluid (edema), stain more poorly, and also show extracellular edema.

With the naked eye, besides swelling and redness, small elevated lesions—papules—may be noticed. A more marked reaction causes an increase of the fluid—serum—and the epidermal cells are broken down to form microscopic vesicles or collections (sacs of serum) at which time the external manifestations are redness, swelling,

*Read at a meeting of the New York State Labor Department in April, 1935.

edema, papules and vesicles (blisters). Ultimately, these vesicles are torn or ruptured, releasing the serum on the surface of the skin, giving rise to a reddened, moist surface. When the serum dries, it forms crusts, or what the laity calls "scabs". These "scabs" contain serum, broken-down cells and bacteria which may be present in sufficient numbers to produce pus, resulting in an acute impetiginous dermatitis.

If the catarrhal inflamation or dermatitis persists for about six weeks, the body tries to recover by forming new epidermal cells, which pile up on the surface of the skin to form scales, and the process is then said to be subacute. If the inflamatory reaction does not subside or involute because of continued irritation or aggravation, or because of the presence of a local predisposing agent or constitutional fault, the condition becomes chronic. The micropathology then also reveals increased cellular infiltration, connective tissue hypertrophy and breaking down of blood cells, with liberation of the red blood cell pigment. The skin now appears thickened, pigmented, inelastic and cracked, especially when stretched, as over the extensor aspects of the joints. Exaggerated scaling is due to heaping up of abnormal horny cells, which pile up in layers because of the chronic congestion and more rapid evolution of horny cell tissue.

The pruritus—itching—which is an almost constant accompaniment of dermatitis, results from irritation of the cutaneous nerves by pressure from engorged vessels, cellular infiltrations, connective tissue pressure, and the irritating action of the contactant, or the toxic products of the reaction.

Thus the clinical lesions are external manifestations of microscopic, catarrhal changes in the skin structure. Dermatitis resembles catarrhs in other organs, as, for instance, gastritis in the stomach, pharyngitis in the throat, and colitis in the large intestine.

### Frequency of Industrial Dermatitis

IT HAS been estimated that skin reactions may be caused by more than 700 substances used in industry. No occupation is exempt from dermatitis. The *Industrial Bulletin* of the Labor Department of the State of New York for June, 1934, stated that of 692 claims heard on the Occupational Disease Calendar in New York City during the year 1933, 461 were for occupational skin diseases. The industries listed, according to their relative frequency of occurrence, were:

1, food; 2, trades, domestic and personal service; 3, fur, leather and ivory; 4, metals and machinery; 5, clothing and millinery; 6, public service; and, 7, building trades and chemicals.

As it is not possible in this paper to mention all the occupations pursued and the various substances that may have been contacted in these industries, the reader is referred, for a more detailed account, to the *Industrial Bulletin* of the Department of Labor of the State of New York, for August, 1934.

According to this article, 20% of the claims originated in the food industries. In this group were workers in 18 different occupations, among them dishwashers, countermen, soda clerks, vegetable washers, confectioners and waiters. The numbers of irritants encountered in a single industry are emphasized as, for instance, water, soap, cleansers, fertilizers, insecticides, flour, spices, sugar and oils.

### Local Causes

SINCE any substance with which the skin comes in contact may be a direct or local cause, the list of possible irritants would necessarily include practically every substance used in all occupations. However, the causative agents vary greatly in their effect upon the skin of different individuals, as well with regard to the type of lesion produced as to the intensity of the reaction. Arsenic, for example, may cause erythema, dermatitis, pigmentation, alopecia, herpes zoster, keratosis and cancer. Impurities in the arsenic preparation or the presence of other chemicals in the finished product may cause a modification in the type of eruption. The direct exciting agents may be grouped into various classifications:

1. *Physical Agents*, such as light, cold, thermal, actinic, roentgen and radium rays.
2. *Mechanical Agents*, such as friction, pressure, pricks, abrasions, cuts, and scratching.
3. *Primary Irritants*, which include the chemicals that produce eruptions in varying intensities in all skins—gaseous poisonous vapors, acids, alkalies, alkaloids, formalin, TNT and phenol.
4. *Specific Irritants and Sensitizing Agents*: These produce reactions resembling allergy in about 70% of individuals. Poison ivy, poison sumac, primrose, plants, vegetables, wood, oils, lacquers, oleoresins, turpentine, hexamethylenetetramine, paraphenylendiamine, iodoform, alkaloids like morphine, quinine, atropin, benzin, aniline dyes, metals like mercury, iodine, arsenic and their derivatives, fungi producing -ids.
5. *Dehydrants and Dessicators*, which dry the skin by taking up water. Alkalies, hypertonic solutions, salt, sugar, and glycerine.
6. *Detergents and Fat Solvents*, which dissolve the horny layer, soften the skin and allow penetration by other chemicals and infectious agents: soap, mild alkalies, water, alcohol, oils, turpentine and analine.
7. *Biologic, Bacteria and Fungi*, which include vegetable and animal organisms. These produce local and general eruptions by their growth and their toxins—anthrax bacilli, pyogenic bacteria, fungi—tinea, monilia, etc.

The physical state of an irritant influences its effect on the skin. Toxic gases and vapors are most active, while fluids are less active than gases, but more so than solids.

The dermatologist should be familiar with the various chemical offenders, the processes employed in factories, and the conditions of the plants in which men work; and he should also compile and report means to prevent and correct existing evils.

### Predisposing Factors

THE difference in action of the various causative agents on the skin of different individuals is so great, that substances producing a marked effect in some will have no effect at all in others. The primary irritants are those which affect everyone in varying degrees. Some react to a first exposure, others only after an extended time.

The intensity of reaction in those who respond thus depends not only on the character of the offending agent, whether it is a caustic or an apparently innocent substance like a plant bulb, but also upon the type of skin. This is partly due to the variations in the structures of the skin with age, sex, race, color and habits of the individual. Other factors predisposing to reaction are heat, cold, moisture, sunlight, the climate and the season of the year. The most important factor in the mechanism of skin reactions is the degree of hypersensitiveness. It is commonly known that in chemical factories only very few men react to weak solutions, while the number of workers responding increases with the increase in concentration of the solution, until finally, at the highest concentrations, only an occasional individual escapes from being affected.

**Allergy and Dermatitis**

THE cutaneous manifestation of this state of hypersensitivity or allergy is called dermatitis, while the term eczema is applied to a catarrhal inflammation of the skin when it is idiopathic, i. e., when the causative agent is unknown, and of constitutional origin. Its clinical and microscopic pictures are similar to those of dermatitis.

The term dermatitis is used for eruptions when caused by contact of the skin with a known excitant. It is not positively known just what may be the mechanism of production, but it is generally accepted as depending upon a phenomenon similar to an antigen (allergen) - antibody (reagin) reaction. When the excitant is brought in contact with the skin, it affects the cells, which in turn attempt to repel the noxious agent by forming antibodies. These antibodies may remain localized, or may be distributed by the body fluids. Subsequent contact of the excitant, antigen, with the sensitized cells results in the reaction produced by the antigen-antibody meeting, and the intolerance of the tissue manifests itself clinically by the catarrahal inflammation that we designate as dermatitis.

The hypersensitivity may remain localized, may spread to contiguous tissues, or the offending agent may be carried to other areas of skin which in turn become sensitized and show eruptions. The condition of hypersensitivity may remain dormant for years, and become manifest upon contact with the original excitant or its derivatives, and even by irritation by non-related substances—a nonspecific reaction.

**Skin Tests**

IT IS of practical value in industry to employ the patch or contact test as a means of determining the hypersensitivity of a worker. To perform the test, a small quantity of the suspected substance is applied to the skin surface. If the substance is a liquid, a small piece of gauze is soaked in the solution and applied to the back or upper part of the arm and covered with wax paper or cellophane, which in turn is held in place by adhesive. Solid substances may be made into a solution or mixed with water and applied in the same manner. The skin selected for the patch test must be free from lesions and be protected from coming into contact with any agents, such as hard or rough clothing, which might produce an eruption by rubbing or contact. It is often desirable to perform a control test is a normal individual using the identical setup in order to compare results. The patch is kept on for 24 hours, unless there is severe itching or burning. After that time, the patch is removed, and the skin is compared with the normal. The reaction may vary from a mild erythema, a one plus reaction; to a four plus reaction with erythema, swelling, vesicles, and open lesions. In the reading of the tests, the reaction from the adhesive should not be confused with a possible negative result with the tested substance. Positive reactions may be delayed, and may appear several days after removal of the substance tested.

The practice of applying caustics and undiluted irritating chemicals to the skin for testing should be condemned. It has been my experience to observe a number of patients with keloids resulting from the use of caustics for testing purposes.

Individuals often disclose polyvalent sensitivity, and it is therefore advisable to identify the various ingredients of the substance to which a patient is found to be sensitive. Some of the new chemical products reported as causing dermatitis may be mentioned at this point:

BAKELITE, which consists essentially of formaldahyde and phenol, looks like hard rubber, and is used in the manufacture of telephone installations and other electrical goods, and also to hasten vulcanization. It has been reported that the phenol present in the varnish may produce dermatitis in a hypersensitive individual.

GALALITH, containing formalin and casein.

ACROLEIN is similar, but more severe in its action, to formaldehyde. It is used in the refining of lubricating oils in oil cloth and linoleum factories, varnish, and tallow and soap factories.

ZAPONE AND BANANA OIL are amyl acetates. Amyl acetate is a very useful solvent—an ingredient of celluloid, shellac, varnish, and paint remover.

TETRACHLORETHONE is the best solvent for cellulose acetate, and is used in a coating or "dope" for aeroplane wings. It is very toxic, destroys the liver and turns the skin yellow.

BENZOL (benzene) and BENZINE are used extensively in dry-cleaning and in rubber, artificial leather, paint, varnish and sanitary can factories.

FORMIC ACID is used as a mordant, to decalcify skins for tanning, and in artificial perfumes, lacquers, and "dope" for airplanes.

CHROMIUM, in the form of chromic acid and sodium and potassium chromates, is very caustic and produces severe and painful lesions of the skin and mucous membranes. It is used in electroplating, dyeing, photo-engraving and lithography.

The numerous coal tar products enter into the composition of the most complex and dangerous new products in many industries. Among them, paraphenylendiamine (ursol) is used extensively for dyeing furs and felts, and it also as accelerator for rubber vulcanization.

ARSENIC is the basis of many compounds used in the glass, metal, textile, rubber, electroplating, dyeing, artificial flower, paper, and other industries. It is present as an impurity in metals like copper, lead, zinc, and bismuth. Numerous cases of arsenic poisoning have been reported among gardeners, tailors, bookbinders, colored-candle makers, felt hat makers, decorators of pottery, fur

handlers, insecticide makers, sprayers of trees, tannery workers and many others.

ANTIMONY is used for printers' type, artificial rubber, and in the manufacture of grids for electric storage battery plates. It produces cutaneous lesions suggestive of arsenic poisoning and internal symptoms simulating and possibly due to admixtures of lead.

The substances mentioned represent only a small number of the more modern chemicals producing dermatitis. The dermatologist should always perform a patch test in cases of doubt as to the origin of the complaint, and familiarize himself with the more important known industrial irritants.

**Constitutional Factors**

CERTAIN constitutional predisposing factors may influence the hypersensitivity of an individual. People of families in which skin diseases are hereditary are prone to dermatitis. The seborrheic individual is predisposed to dermatitis. He shows a greasy skin, a tendency to acne, baldness and repeated attacks of boils and carbuncles. When a dermatitis develops in this type, it tends to affect the scalp, the region of the nose, the front of the chest, and the areas that contain numerous sebaceous glands, as on the neck, in the armpits, the groin, and perianal region.

The presence of seborrhea alters the appearance of dermatitis, and consequently results in doubtful diagnoses. Pyogenic infections, such as folliculitis and furuncles, are frequent accompaniments of dermatitis. Myriads of microorganisms are present in the skin and cause no harm, but when the resistance of the skin is broken down by trauma—i. e., a blow or scratch, no matter how slight——the microorganisms enter and cause inflammation. The primary changes are similar to those already described for dermatitis; in the presence of increased heat and moisture the bacteria multiply rapidly and flourish profusely, as they are nourished by the blood. A battle ensues between bacteria and the white blood cells, the phagacytes, and, with their breaking down, pus develops.

Pyogenic infections modify the clinical picture of the dermatitis. The products of infection enter the circulation and are carried to other parts of the body to sensitize the skin and make it more susceptible to dermatitis. Some individuals seem to be predisposed to fungus infections. The important relation of tinea infections to industrial dermatitis will be discussed more fully below.

Urticaria, hay-fever, asthma, and migraine are also hereditary to a marked degree, and the history of family neurotic predisposition forms a background for allergic phenomena of dermatitis.

The neurogenic patient is particularly prone to dermatitis. Such patients disclose areas of inflammation, especially in the folds of the skin, on the flexor aspects of the elbows and knees, and on the back and sides of the neck. Many of the obstinate chronic generalized dermatitides that are difficult to cure and show recurrent attacks over a period of years belong to this group. It would be profitable for employers, particularly in chemical factories, to examine all applicants for possible evidence of involuted or active lesions of this condition, in order to exclude such individuals from exposing themselves to contact with substances which will produce dermatitis.

Patients with an icthyotic tendency, as characterized by abnormal dryness, thickening and parchment-like skin on the palms, and the front of the tibias, and follicular plugging of the outer surfaces of the upper part of the arm, suffer severely from cold and moisture.

Dermal sensitivity may be increased by other abnormal systemic conditions, such as foci of infection in various parts of the body; by metabolic disease, as diabetes, gout, nephritis; by general infections, as tuberculosis, syphilis, diphtheria; by dysfunction of the endocrine and vegetative nervous systems; and by general debility and bad habits.

Cutaneous abnormalities, growths and deformities, predispose to dermatitis. Cutaneous conditions—such as abrasions, horns, psoriasis, dermatophytosis, chilblains, neurodermite, hyperidroses and ulcers, to mention only a very few—when traumatized or irritated by increased heat and moisture, favor the development of dermatitis. Associated or underlying conditions such as varicose veins and Raynaud's disease, increase the tendency to dermatitis.

**Differential Diagnosis**

AS ALREADY indicated, the characteristic lesions of dermatitis are redness, swelling, papules, vesicles, moisture, crusting, scaling, thickening, fissuring, lichenification and pigmentation. The lesions tend to form patches with borders that fade gradually into the surrounding skin. The salient subjective symptom is itching. The inflammation usually affects the areas which were first contacted, therefore the hands, fingers, wrists, and forearms are preeminently affected. The face, neck, and thighs are common sites, and occasionally the eruption may be generalized.

The differential diagnosis from certain diseases which simulate and at times complicate dermatitis is often most difficult. Such diseases are dermatophytosis, psoriasis, and others. Particularly in the case of multiple conditions, the clinical picture is confusing and calls for expert judgment in determining the extent of disability due to industrial dermatitis. I have observed numerous cases, referred to me as occupational dermatitis, which were actually cases of dermatophytosis.

Dermatophytosis usually begins on the feet, and may occur in several forms that are best described as intertriginous, vesiculosquamous, pyodermic, and hypertrophic in type. The patches may be circular or irregular in shape, are sharply circumscribed, and show elevated borders with papules, vesicles and pustules. The diagnosis is confirmed by the finding of mycelia and spores by microscopic examination of specimens removed from the lesions, and by a study of growths on culture media. The trichophytin test is not of great value, as it was misleading and positive in over 75% of patients who had formerly had the infection but no longer suffered from the disease at the time of examination.

The condition of dermatophytosis is not compensable, but it is a rather common infection among several occupations. Workers on hides, leathers, wool, rugs and carpets, canned goods and groceries, bakers, farmers, cattlemen, liverymen and veterinarians, hair workers and brush makers, suffer frequently from fungus infections.

In many a case the patient who has not worked for months or years, and has not been exposed to any occupational irritant, complains of repeated attacks of "dermatitis" which is actually merely an inflammation due to a focus of tinea infection, usually on the feet, and often insignificantly mild in character.

In the case of a rug buyer, an itchy, scaly condition of the hands was diagnosed by his physician as dye dermatitis. When I examined him, he presented well-defined, scaly patches on both palms. There were no lesions anywhere else on his body, and the feet were not affected. Because of the clinical appearance of the condition, the scales were examined and fungi were found, confirming my diagnosis of dermatophytosis. It was discovered that the patient was accustomed to passing the palms of his hands over the surface of the rugs to determine the resiliency of the wool, and in this way he acquired the infection. This was a frank case of dermatophytosis of occupational origin, but was not, however, compensable, since tinea infections are not covered by the law.

Another patient recently observed presented dermatophytosis of the hands and feet. The diagnosis of fungus infection was confirmed by the microscopic detection of mycelia and spores in scales removed from both the hands and feet. This claimant had alleged that the inflammation of the hands and fingers had been caused by dyed fur. The patch tests performed with the fur proved negative, and it was concluded that there was no causal relationship between the eruption and the patient's work. The diagnosis of chemical dermatitis is often offered when the dermatitis is of parasitic origin and bears no relation to the work.

In another case, a cook was referred for treatment of a burn of the hand that had been produced by the spilling of hot fat on the right palm. Examination of the rest of the skin revealed nothing abnormal, except for a fungus infection of both feet. Subsequently, inflammatory lesions appeared on both hands and all the fingers. These were dermatophytids, and resulted when the resistance of the skin was lowered by the trauma. Sites of dermatophytosis, when traumatized, liberate fungi into the circulation and cause allergic phenomena in the form of trichophytids. Trichophytids tend to aggravate dermatitis and prolong the course of the disease.

The greatest difficulty exists in differentiating dermatophytids from dermatitis, in some cases, because of their almost identical clinical appearance. It is in such cases that the history, the laboratory examination, and the patch tests are most valuable.

Among confectioners, bakers, and fruit canners, infections by yeast fungi are observed. These outbreaks may be localized to the fingers and hands, or may become generalized to produce an eruption suggestive clinically of dermatitis.

The hypodermic injection of extracts from fungi, trichophytin, has been advocated for the purpose of diagnosis and treatment of trichophytosis and moniliasis. This procedure is practically valueless, because the positive reactions are misleading. They may be obtained in almost all individuals, even when the infection has been cured, and may also appear in the presence of other diseases. For therapeutic purposes, it necessitates the administration of the drug over an extended period, may produce untoward reaction, and is usually without benefit.

Another condition simulating and complicating industrial dermatitis is psoriasis. The lesions in this disease are, as a rule, dry, and covered with a shiny, whitish scales that disclose underlying bleeding points when removed. The eruptions usually develop on the extensor surfaces, on the scalp and nails, and do not itch. The patches are sharply defined. A male patient (Corbin) aged 53, suffered from dermatitis of the palms produced in the course of his work as a millwright and machinist. Upon examination, the skin not only revealed lesions of acute dermatitis, but also sharply outlined, infiltrated patches of chronic psoriasis. The dermatitis was cured after treatment, but the psoriasis, though improved, persisted for several weeks thereafter.

In seborrheic dermatitis, the surface is oily, covered with greasy, yellowish scales, and the borders are more prominent. It occurs usually on the scalp, the middle of the face, around the ears, over the sternum and between the shoulder blades. Lesions are never present on the hands and fingers, which are the favorite sites of dermatitis.

Other conditions which may be confused with dermatitis are scabies, syphilis, lupus erythematosus, granuloma fungoides, lichen planus, erythema multiforme, and even pemphigus. Sycosis vulgaris had been called dermatitis of the face in the case of a furrier who was referred for my opinion only a few days ago. On the same day I examined a farmer who supposedly suffered from dermatitis venenata, though there was no doubt in my mind that it was an attack of herpes zoster. It requires a vast amount of experience in dermatology to diagnose properly such multiple conditions of the skin, but it is of utmost importance to the employer as well as to the patient, since a prolonged treatment is naturally more expensive, and the disability treated in a case of faulty diagnosis may thus be a non-compensable one.

**Dermatitis Artefacta**

ERUPTIONS induced by the patient himself are termed dermatitis artefacta. The characteristic lesions, simple erythema to areas of gangrene, are encountered most frequently in neurotic and hysterical persons. Among the occupational dermatoses, various chemical and mechanical irritants are used to produce such a condition with the intent to collect insurance or to avoid duty. The diagnosis may readily be made by the experienced dermatologist. The lesions occur usually on the front of the body and other spots that are most easily reached by the right hand. The patient, when accused of self-infliction, is profuse in his denials and frequently persists in aggravating the condition for which he is under treatment.

The lesions look artificial, and do not constitute a definitely recognizable entity. The borders are sharply defined, clean-cut, pointed angular and bandlike in appearance. Dots or streaks are present where the chemical may have been applied and where it ran along the surface of the skin. The condition appears very suddenly and takes a rapid course, but the healing is often delayed because the patient purposely keeps the lesion open.

The malingerer differs from the neurotic who unconsciously excoriates the skin and produces

changes and lesions without an evil intention. Many an individual absent-mindedly removes what he considers to be blemishes or irregularities in the skin. Such patients should be constantly warned to avoid removing crusts, and to control the desire to scratch, for fear of aggravating the condition for which they are under treatment.

Besides purposely inflicting a condition of dermatitis upon himself, a patient applying for compensation may have contracted or aggravated his skin disease outside of his occupation. A case of this type was a cabinet maker suffering from dermatitis of fingers and hands resulting from an irritation by varnish that he had used in his work. After the inflammation had subsided more than 80% the patient was still allowed total disalibity in order to permit a perfect cure. One day he appeared in the office with a fresh eruption of vesicular dermatitis and superficial burns, and later had recurrent attacks of this sort, though he was, supposedly, not working. It was accidentally discovered that in doing independent odd jobs he had come in contact with irritants including lye, which he had handled with his bare hands while removing old stains from furniture. Obviously, these recurrent attacks of dermatitis bore no causal relationship to the patient's occupational dermatitis for which he was being compensated, and, in my belief, such cases should no longer be compensable, since the fresh attacks were produced by a different irritant from that encountered in his original occupation. In another instance, an electroplater, after years of work, developed a dermatitis, and it was shown that his skin reacted positively to chrome salts. The eruption was treated for years by experienced dermatologists, and periods of improvement alternated with periods of aggravation. He did not work at his job during this time. When I examined him I noticed that frequently, after the skin had improved, and was practically free of lesions, fresh vesicles and oozing patches would appear. Investigation revealed that the patient did house work, washing dishes, and even painting rooms and the exterior of his house at times. Against advice, he continued exposing his skin to irritation. He was always protected by the theory of allergy, for he knew that no matter what other physicians or myself would say, he was allowed compensation by claiming that the original inflammation bore a causal relationship to his work, and that the other irritants were not harming him. In such a case it would be advisable to hospitalize the patient, thus eliminating the noxious causative agent, and at the same time protecting him from other sources of irritation that he may encounter, even in his home. After a complete cure has been confirmed by a representative of the Labor Department, the patient should be discharged and told to seek another form of employment where he would not be exposed to irritation by a proved excitant.

In a similar manner, the theory of hypersensitivity lends itself readily to claims that cannot be proved scientifically, and for which compensation is not justified. An employee in a chemical factory, for instance, developed a burn from pouring sulphuric acid on his fingers. The burn healed without complication and left a scar, but future conditions of industrial dermatitis in the worker were claimed to be due to, or predisposed to by, the old burn. Sulphuric acid is a primary irritant and causes inflammatory lesions by burning the skin, and not as a result of hypersensitivity. A patch test with the acid will inflame all skins, and so-called positive tests are false reports, yet such evidence is accepted as a proof of hypersensitivity. R. Prosser White stated that "chemical irritants which are so extensively used in trade processes, and which have been proved capable of causing sensitization, are very few indeed." The improper use and interpretation of patch tests may do much harm and may increase the cost of compensation immensely to the insurance carriers.

**Prevention**

THE basic principle of compensation laws is not only to afford care and compensation to the disabled, but also to prevent injury and death from the hazards of industry.

As has been emphasized, occupational skin diseases are responsible for the greatest number of claims filed for compensation. The number and types of cases vary with the different industrial centers, and different industries show different types of infections. In Ohio, with its numerous rubber factories, rubber dust is the chief culprit. In New York State the largest percentage is due to general irritants, like caustic acids and alkalies. A superficial vesicular rash is produced by plants and observed among florists and lacquer workers; blackish stains of the nail folds and free borders are common in workers with dyed furs; keratotic lesions from arsenic occur among painters, workers in felt, exterminators, farmers; mucous membrane lesions of the mouth from mercury among dentists and workers in scientific instruments—and such a list may be extended ad infinitum.

In order to prevent the frequent occurrence of such skin conditions, all necessary and possible precautions should be taken. An applicant for work that might expose him to contact with an irritating substance should be subjected to the patch test before being admitted to work and, in case of a positive result, be employed in some other occupation less dangerous to him. Every applicant should be allowed a thorough cutaneous examination, and a record of his family history, previous skin disease, and substances handled in former jobs should be kept. The habits, personal hygiene and constitutional complaints should be noted. Occupational stigmata, like stains, pigmentation, scars, telangiectasias, keratosis and deformities should be investigated. The blond, the dry, the thin, the atrophic, the seborrheic and the icthyotic skin are predisposed to dermatitis. The skin should be tested for Nikolsky's sign, for a blister on the foot or mouth may be the first sign of a serious disease like epidermolysis bullosum or pemphigus. Chilblains, or a cold, clammy, purplish skin may suggest early Raynaud's disease. Exaggerated dermagraphia, erythemas and hyperidrosis indicate poor vasomotor tone and increased susceptibility to occupational dermatitis. Chronic skin diseases like lupus erythematosus, lupus vulgaris, dermatophytosis and others should be recorded.

The laboratory should be used for detection of abnormalities, such as the presence of hematoporphyrin in the urine, determination of the Wassermann test and other similar tests, a microscopic study of tissue, and for the presence of tinea. All susceptible individuals should be excluded as applicants.

Furthermore, the physical and hygienic condi-

tions under which the men work should be under constant supervision of a physician. The importance of personal hygiene must be impressed upon the employees and, where practicable, they should be periodically examined and any skin conditions detected immediately treated and recorded for future reference. The employees should be given instructions as to the dangers of the particular type of work they are employed in, and how to protect themselves. The wearing of gloves and the use of grease safeguard against excessive moisture and dryness. Gloves should be kept clean and free of chemicals and infectious agents, and they should be washed every day. Excessive perspiration and irritation from the gloves themselves should be avoided. A weak vinegar solution should be applied to neutralize alkalies, a weak alkaline solution for acids, oxidizing substances like sodium sulphite for chrome, and dilute alcohol to remove irritants like lacquer, foreign particles and infectious agents. At the end of the day, a shower with sufficient clean towels should be supplied. R. Prosser White advised the preliminary use of sodium sulphite before the bath in all industries involving exposure to chemicals, dyes, drugs, coloring materials, irritating dusts or fluids. A warm solution of this chemical is also valuable in removing color stains on the skin, wool, cotton, leather and wood.

The plant itself should be equipped with every protective installation necessary, such as proper ventilation, exhaust hoods to remove poisonous and irritating fumes, sufficient heating facilties, protective equipment against electric shocks and burns, and others, according to the nature of that particular type of industry. When the first sign of inflammation of the skin appears, this should be immediately dressed and the individual concerned transferred to another department if nesessary.

**Treatment**

A CAREFULLY taken history indicating the conditions under which the man has worked and all previous attacks is evidently of utmost importance for an intelligent treatment. The external treatment differs according to what may have been the exciting agent, the stage of the disease, its situation, and the type of lesion.

The first step is to remove the causative agent, in a manner as has been indicated above, by acids, alkalies, sodium sulphite, dilute alcohol, etc. Such topical and physical agents should then be applied as will remove the pathological tissue and hasten involution, so that there will be restitution of normal tissue.

In the earlier stages, dilute wet dressings, powders and lotions are advised to promote the radiation of heat, evaporation of the serous discharge, and to relieve congestion and favor absorption. With the subsidence of the acute stage and the tendency of the lesions to become drier and scaly, pastes are employed. Best results are obtained by spreading the paste on strips of unbleached muslin or gauze, which are placed upon the inflamed skin and bandaged lightly. Dressings must be frequently changed in order to avoid irritation from discharges and infections. If the condition tends to become obstinate and weeping persists, with imperfect keratinization, slightly astringent wet dressings combined with applications of solutions of silver nitrate and tar may prove to be of value.

When the eruption is of a chronic type, with thickening, infiltration and lichenification, more stimulating ointments are employed. Various tar products achieve excellent results. In the more infiltrated and thickened patches, the ointment should not be merely applied, but rubbed in vigorously.

Of the physical therapeutic agents, x-rays are the most valuable for chronic lesions and pruritus. Others, like cold quartz rays, ultraviolet rays from Alpine lamp, and infra-red rays, are used mainly for stimulation. At times they are employed to convert a resistant eruption into an acute inflammatory one, so that relief may finally be obtained by soothing and protecting the intentionally produced acute dermatitis.

This indicates, in brief, the usual procedures employed in the local treatment, and the reader is referred to special books on the subject of dermatology for more detailed discussions of the various special procedures which vary according to the nature, site, and cause of an eruption.

Most patients applying for the treatment of industrial dermatitis are apparently in good general health. However, internal treatment is often of value in hastening a recovery. In the acute phases of the condition, elimination through the bowels should be promoted. In addition, the use of mineral oil, milk of magnesia and colonic irrigations may aid in the relief of chronic intestinal intoxication. If the patients are nervous, irritable, and complain of itching or even pain, calcium and bromides are indicated. Opium and its derivatives should not be employed for the relief of itching, as these preparations actually increase the pruritus.

In generalized chronic types of dermatitis, the use of alkalies, particularly of alkaline diuretics, is of value. The diet should be modified to meet individual requirements. The undernourished should be paced on a nutritious diet, the obese on a restricted one. Putrefactive, highly seasoned, spiced foods and condiments, as well as rich foods, should be eliminated or reduced. In the gouty and diabetic, the diet should be employed to meet the internal condition. A non-allergic diet is frequently used for hypersensitive individuals.

**Conclusion**

MANY phases of the subject have not been mentioned. The incidence of dermatitis is rapidly increasing because of the advance in chemistry and the introduction of new chemical materials and processes. In this article, the etiology, both local and constitutional, was briefly described, and particular emphasis was placed on the importance of detection of the specific excitant, in order to determine the causal reation existing between the work and the dermatitis. The relation of constitutional conditions, especially as regards sensitiveness, was discussed. It was pointed out that an early diagnosis is necessary to reduce the period of disability and to return the patient as quickly as possible to his work. Besides local topical and physical therapy, constitutional disorders must also be corrected, in order to diminish the possibility of recurrence.

The dermatologist who practices industrial medicine must combine medical knowledge with that of sanitation and the requirements of the compensation law. There should be close cooperation between the physician and the industrial engineer, in order to safeguard the health and improve the environment of the employee.

The experienced dermatologist may save employers, insurance carriers and the community large sums of money by the early and prompt application of preventive and curative measures.

Finally, the doctor turns to the worker as his chief aid. The worker in hazardous occupations must become familiar with the hazards of his occupation and aid in avoiding them. Employers should cooperate in protecting the employees by installing the necessary safety measures and devices.

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# Silicosis Cases

THE following case histories and their roentgenograms illustrate the various stages of silicosis and silico-tuberculosis.*

There are 13 cases in all; five of the histories are given here—without the roentgenograms. The early stages do not lend themselves well for the purpose of reproduction as the fine nodulation is not easily reproduced in the cut.

Of the 13 cases presented, 11 were negroes and two white. Four of these had positive sputum, five were persistently negative, the four others had no record. Eight, or 61%, have succumbed either to silico-tuberculosis or silicosis and an incurrent infection. Five are living (two of whom are working,) two incapacitated, and one has been lost. Classified on the basis of their silicosis there were seven third stage, three second stage, and three first stage silicosis.

CASE 48,776, G.B., colored, male, age 43. Examined June 25, 1934. Present illness began three years ago with pain in lung and cough. Present complaint is cough. States that he previously had influenza and pneumonia. His normal weight is 190 pounds, present 158; has lost 32 pounds in three years. Complains of dyspnea on exertion and lying down. Appetite and digestion good. He expectorates a cupful a day (questionable).

Occupational history: Patient is a tub-grinder and has worked at a local plant for six or seven years. Says he first worked on sand-blast one year and then ground tubs from 1924 to 1931.

Physical examination: Shows slight impairment in apices and both root regions; with a few fine inspiratory clicks, inferior angle, left scapula and a few inspiratory rales in base. A few fine rhonchi in right base, front; with wheezy inspiration. Complains of tenderness in left anterior axillary line in base on percussion. X-ray showed heavy hilus shadows with heavy streamers in all directions to third zone with fine nodulation along their course characteristic of a first stage silicosis. Blood pressure 114/86.

His present condition causes no disability. On advice patient has left present employment and will seek another position.

CASE 46,747, C.T., colored, male, age 40. Examined February 3, 1934.

Present complaints: Has had shortness of breath since a child. Had influenza in army 1917. Patient states that he had a slight shortness of breath but does not pay any attention to it these days due to the fact that he is stout. Patient well developed and well nourished, weight 220¼ pounds.

Occupational history: Sand-blaster from 1919 to 1923 on handblower, local manufacturing plant.

Physical examination: Negative except for feeble breath sounds and a mild wheezy bronchial cough. Chest circumference full inspiration 44, expiration 43. Blood pressure 130-110. X-ray film shows heavy root shadows with a marked exaggeration of linear markings. Considerable fine mottling scattered in the lung fields indicative of an early first stage silicosis which is apparently not producing symptoms. Diagnosis: First stage silicosis. Present condition: Patient is working full time and disease is not incapacitating.

CASE 47,877, C.R., colored, male, age 37. Examined April 24, 1934.

Present illness began five weeks ago with pneumonia. Present complaints are slight cough, pains in the left side, dyspnea on exertion and lying down, loss of weight and loss of strength. Normal weight 149, present weight 119½; has lost 27½ pounds in five weeks. Appetite and digestion good. Has slight expectoration, oz. ½, yellowish.

Occupational history: Patient states that he worked at a local manufacturing company for 12 years, was exposed to considerable dust. Says he was trucker for the sand-blast machine until three or four months ago. For the past four months has been a tub-buffer, rubbing tubs down with an emery wheel. Patient states that he felt well up to the time that he did this last work.

Physical examination entirely negative except for some slightly diminished resonance in the right apex. Breath sounds were feeble, no adventitious sounds, no bronchial cough. Blood pressure 128/78.

Fluoroscopic examination showed moderately heavy roots with a suggestive granular appearance of the lung fields. X-ray film, April 24, 1934, shows the characteristic heavy linear markings with nodulation in the lung fields with inflammatory reaction in the left base, probably pleuritic. Re-x-ray September 1, 1934, four and one-half months later, shows clearing in the left base but persistence of the characteristic nodulation throughout both lung fields. The apices have apparently escaped. The findings are indicative of a second stage silicosis. Twelve sputum examinations were negative for tubercle bacilli.

His present condition is not totally disabling. On advice, patient has left present employment and will seek a position as chauffeur. The lesion, however, can be expected to slowly progress and prove incapacitating later.

CASE 38,927, W. McC., colored, male, age 33. Examined April 11, 1932.

Present complaints: Began three months ago with tiredness, cough, fever, pain, vomiting his meals for the past two months, expectorates about one-half teacupful, has had blood streaked sputum, the last day, has shortness of breath on exertion.

Occupational history: Sand-blaster at a local manufacturing plant for two years and then entered cleaning and pressing business for three years. Patient developed fever and from April 11 to May 9 ran a temperature from 101 to 102. Pulse 104 to 110. Had cough and night sweats.

Physical examination is essentially negative except for a few dry inspiratory rales in the right first interspace. X-ray shows very heavy root-shadows with considerable coarse mottling both lungs from base to apex typical of a second stage silicosis. Patient died May 28, 1932. There is no history of sputum examination. Conclusion: Second stage silicosis.

CASE 22,425, H.M., colored, male, age 63. Examined July 2, 1927.

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* OSCAR O. MILLER, M.D., in *Kentucky M. J.*, June, 1935.

Chief complaint: Cough, shortness of breath, sputum streaked with blood, weakness.

Occupational history: Worked at a local manufacturing company for 25 years. Was operator of sand-blast machine for three years.

Physical examination showed slight impairment in apices and root region. Breath sounds wheezy with a few inspiratory rhonchi over the base. Chest emphysematous in type. Heart normal. Blood pressure 140-68. The x-ray film shows the typical heavy hilus shadows with heavy linear markings and coarse nodulations throughout which is characteristic of silicosis although this was not suspected at the time of examination. Patient was kept under observation and due to increase in symptoms was admitted to Waverly Hills Sanitorium for observation in 1928. Discharged to his home in 1929.

Re-x-ray five years later showed considerable increase in pathology, the heavy density and fibrosis in the left mid-chest showing a characteristic progress and classified as third stage silicosis.

Patient died February 21, 1933, with advanced silicosis or more probably advanced silico-tuberculosis.

CONCLUSIONS: Silicosis is a progressive incapacitating disease of considerable importance to the profession and industry.

Silicosis is also of considerable importance to labor as it is definitely incapacitating and in our small series has shown a mortality of 61%.

It will be necessary for industries with a definite silicosis hazard to introduce measures to protect their workmen from silicosis dusts and themselves from suits and damages.

To this end the plant employment bureau should take an occupational history of the applicant for work in siliceous dust and exclude those who have worked in mines or previous dusty trades.

It will be necessary for the protection of both employer and employee, for the plant either to establish an x-ray department with a competent roentgenologist as consultant or to contract for this work to be done by an x-ray laboratory.

Where the plant employs an industrial physician it may be possible for him to undertake the necessary x-ray examination in his office and the company to provide a consultant.

All prospective employees for work in siliceous dust should have an x-ray of the chest in addition to complete physical examination and an occupational history.

Once assigned to the job, the employee should be re-x-rayed every year thereafter, and upon the first roentgenological evidences of pulmonary changes he should be transferred to another job.

Employees who leave the plant of their own accord should similarly be x-rayed in anticipation of possible future suits.

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# Physical Therapy

## in Traumatic Surgery

THE first point is: *Be sure that physical therapy is indicated.** For many years the author was puzzled over the treatment of epicondylitis humeri. This consists usually of an evulsion of the muscle fibers from the periosteum of the external condyle. After all possible mistakes, he hit on the idea of immobilizing the forearm with a cocked up splint at the wrist, putting the muscles and the injured part at rest. He was surprised at the result. The treatment actually did harm. The writer mentions the importance of position in the treatment of paralyzed or weakened muscles. Don't treat a weak deltoid muscle unless the shoulder is held in abduction.

The second point is: *Treat the pathology.*

Some years ago an orthopedic surgeon asked the author to see a private patient of his who had sustained a fracture of the clavicle, with anesthesia and atrophy corresponding to the distribution of the ulnar nerve. He had received physical therapy for his hand and forearm for several weeks. On examination the patient had a large callus at the site of the fracture, pressing on the brachial plexus. The author directed treatment to the callus. On the second week definite improvement was noticed, and in four weeks, the patient was well and discharged.

The third point is: *Use the proper kind of treatment.*

To illustrate the third point, the author describes a case which he saw in July, 1934. An elderly lady age 70, in May of the same year, fell and fractured the distal end of the right radius, and the styloid process. She was put in a plaster splint for four weeks, and the fracture was considered united. However, the patient had developed the most excruciating pain in her hand and forearm. She could not move her wrist or fingers. She had to take narcotics day and night. Her doctor diagnosed a traumatic arthritis, and ordered heat, massage, and manipulations. She had had this treatment two months, and showed no improvement, in fact she got steadily worse. Her doctor had advised her to go to the mountains for six months. When the author saw this patient, she had been in bed for two weeks, her general physical and mental state was very low, and the hand was so painful she would not let anyone touch it. Her hand showed atrophy of soft tissue, skin and nails. The skin was white, and the folds of the fingers were obliterated. She had no motion in wrist or fingers. An x-ray showed marked atrophy of the bones of the hand. The massage and exercises were stopped; the hand was put at rest; and paraffin treatments with ultraviolet radiation started. The pain disappeared, motion returned gradually, and the patient, when last seen in October, showed the author an oil painting which she had made.

Another case was cited of a hospital patient whose doctor did not believe in physical therapy. This occurred about 10 years ago. The patient had an infected hand which had been opened up, and every day he had a very painful dressing consisting of vaseline gauze and balsam of Peru, which prevented drainage. No attempt was made to move the fingers. When the patient did not improve, the author was allowed to treat him. Whirlpool baths with motion of the fingers in the water were given, and after three weeks he was sent to the occupational therapy department. He was discharged with a very good functional hand.

Fourth point: *Stop your physical therapy treatment when no progress is seen.* We often do a great deal of harm to compensation patients by treating them too long. We make invalids of them. We take the responsibility for getting well away from them, and they get to rely on somebody else. This is where the compensation clinics have done so much harm to physical therapy. It is the belief

*KRISTIAN G. HANSSON, M.D., in *Internat. J. Med. & Surg.*, January, 1935.

of the author that the solution lies in having such patients treated in a hospital, which is under the supervision of a doctor on salary, and therefore, economically independent in his judgment as to when such a patient should be discharged.

Fifth point: *Whenever possible, cure a patient permanently instead of temporarily.* In mentioning this point, the author has in mind all traumatic back cases, except of course fractures and cord injuries. In a general way we might say that back injuries from overactivity require rest as immediate treatment, and also support. During this time any form of heat, electrotherapy, massage or manipulations that relieves the patient is indicated. It has been the sad experience of the author that if rest and support are provided, it takes from two to six weeks to relieve such a patient, regardless of what other treatment he is getting. It has been learned that in low back pains, patients can be rendered a great service in preventing future attacks by showing them how to stand, walk and lift.

We can also help them to reconstruct the proper position of body mechanics, and strengthen the pelvis and the spine. This postural training should follow all treatments of low back pain.

Sixth point: *Our physical therapy treatments should be followed by home treatments.*

In the after treatment of fractures, when the functions of surrounding muscles and adjacent joints are concerned, it is not sufficient to have the patient treated one-half hour every other day, and let him go 47½ hours doing nothing. He should be given a regular schedule to follow. If the function of the left shoulder is impaired, let patient lie on a table on his left side, with the upper extremity over the edge, and the head supported on a chair. Let him swing the arm like a pendulum in flexion, extension, abduction, adduction, and rotation. This should be practiced t.i.d.

In a case of fracture of the femur, where limitation of motion in the knee and atrophy of the quadriceps are so common, the following schedule should be followed: have patient contract the quadriceps 12 times every hour, and have him put his foot against a chair, flex and extend knee for five minutes, t.i.d. These schedules should be definite, and put in writing like a prescription; the carrying out of the home treatment should be checked up when a patient comes for treatment. It is believed that this kind of home treatment will shorten the convalescence considerably. When feasible, occupational therapy can replace this home treatment.

Seventh point: *Use properly trained technicians.* If the technicians that you are employing were examined according to the requirements laid down by the council of Physical Therapy of the A.M.A., very few of them would qualify. This is probably the greatest problem in physical therapy today. The requirements laid down by the council are physical education or nurses' training, and at least one year in a recognized Physical Therapy school.

*Conclusions:* We may divide the use of physical therapy into three groups: (1) where it is essential; (2) where it is comforting; (3) where it is contra-indicated.

The author believes that physical therapy is essential in 75% of all industrial accident cases. It is his experience that physical therapy is comforting in all accident cases, and only contra-indicated where the pathology may be spread or accentuated. However, we must keep in mind that modern physical therapy is not only baking and massage, but all applications of heat, cold, and light energies, the various forms of electrotherapy, passive exercises, as well as all mechanical appliances.

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# Adolescents in Industry

DR. LANGELEZ, "inspector general," of the Service medical du travail, has an article in the *Revue du travail** on the sanitary supervision of adolescents. In 1920 the work begun by Dr. Glibert in this field was sanctioned by a royal decree. Dr. Langalez, who for a number of years has been in a position to observe how the prescribed measures are applied and what results are secured, gives a summary of his observations.

The sanitary supervision of adolescents in industry, as organized in Belgium, is designed to render to the adolescent man power in our industrial plants constant service. In guiding youth's first steps in the industrial life, in aiding young persons in the choice of a means of livelihood and in their adaptation to the trades, in supervising their first years of industrial activity, in watching over the less alert and in discovering at the start disturbances of health, this organization deserves a special place among the movements whose avowed task is the protection of workers. As Dr. Glibert said one day: "What finer service can physicians render than to watch over the normal development and the physical growth of the future generation of producers of wealth?"

To say that the organization as it exists is perfect would be an error. But does it reach all those it is designed to aid; namely, boys and girls from 14 to 18 years of age in all industries except that of the home and the exploitation of agricultural work? One may reply that the organization functions efficiently in the major industries, in the middle-sized industries, and in a large portion of the minor industries. Its principles are the most difficult to apply in the minor industries in which there are only one or two apprentices; but in the trades presenting appreciable dangers the health of adolescents is periodically observed.

"Are the medical examinations made with sufficient care?" "Is there, in the organization of this service, nothing mechanical in the administration and in the paper work?" In reply to these questions, it should be said that sanitary supervision is as all other human endeavors. The better the physician, the better the work is done that is entrusted to him, whether it is a question of industrial medicine, inspection of schools, consultations for nurslings or anti-tuberculosis dispensaries. There are, however, certain organizations that are practically perfect, in which the physicians perform their tasks with the zeal and conscience of an apostle. Men of their caliber understand that the medicine of today demands more than formulas for treatment and prescriptions of drugs. The physician of the future must not devote his entire attention to therapeutics, but must take on new activities born of modern hygiene and of preventive medicine. The protection of childhood, the medical surveillance of school children, and the sanitary supervision of adolescents in industry are movements the social value of which is apparent.

*Belgium Correspondent, *J.A.M.A.* (August 31, 1935).

# "Industrial Medicine"

*—A Review of the Recent Medical Monograph by Clark and Drinker—*

INDUSTRIAL physicians and also those who practice in an industrial community have long needed a handbook for reference purposes, concerning the problems of industrial medicine.

A book of this kind is now available. It appeared recently as one of the National Medical Monographs under the title of "Industrial Medicine," written by Dr. W. Irving Clark, assistant professor of industrial medicine at the Harvard School of Public Health, Boston, and Prof. Philip Drinker, associate professor of industrial hygiene at the Harvard School of Public Health, Boston.

As the authors state in the preface: "To most general practitioners industrial medicine is an unknown field. Although in many instances a physician is working in an industrial community and caring for industrial accidents and cases of industrial disease in his private practice, a knowledge of the means by which these accidents and diseases have originated is far from clear. It will be our effort in this book to clarify his knowledge of what industrial medicine is, to assist him in understanding conditions under which his patients work, to discuss his contacts with an industrial medical department when one exists in a neighboring industry, and to inform him of standard practice in the industrial medical field."

A very important conception regarding the problems of industrial medicine is also stated in the preface: "Prevention of industrial disease is largely an engineering problem as its basis is the separation of the toxic or irritating substance from contact with the worker. The industrial medical department, however, must cooperate with the engineering department by discovering the health hazard, determining its distribution, and pointing out its origin. Then only is the engineer able to direct his attack at the source of the danger." This statement would indicate that the authors have definitely in mind a concept which is of great importance in industrial medical work, namely, that the physician must integrate intelligently the existing industrial health hazard with the effects of such an environment upon the human body, as manifested by the clinical findings. Although this idea is not new, it having been expressed several times by a number of industrial physicians, including the reviewer, it is significant that this principle has been put into a volume for the practical use of the industrial physician.

A glance at the table of contents shows the wide range of the monograph: (1) *Industrial Medicine Department*—referring to organization, physical layout, examinations, records, accidents, safety engineering, compensation and insurance; (2) *Industrial Surgery*—including various types of injuries and their treatment and rehabilitation; (3) *Industrial Medical Service*—a discussion of the general scope, records in small groups, cooperation with insurance companies, and social service agencies; (4) *Industrial Diseases*—data relative to temperature, humidity, air conditioning, ventilation and other conditions; (5) *Dusts*—the physical factors, chemistry, inhalation and retention, fibrosis; (6) *Pneumoconiosis*—(there are three chapters on this subject—)relating to silicosis and asbestosis and their medical aspects—a consideration of the non-disabling fibroses—and a discussion of functional disability and the methods of determining the harmfulness of dust; (7) *Lead and Metal Fume Fever*—relating to medical findings; (8) *Industrial Dermatoses*—regarding the diagnosis and prevention of arsenic effects and anthrax; (9) *Gases, Benzol, Asphyxia and Artificial Respiration*—an assembly of information regarding various types of gases, with the principles of asphyxia and artificial respiration; and (10) *Prevention of Industrial Diseases*—under which is given a discussion of threshold exposures, changing of process, control of dust, exhaust equipment, and protective equipment of various types, concluding with dust and gas determinations. A selected bibliography of 174 references, and author and subject index separately classified makes up the rest of the volume.

**Examinations, Diseases and Injuries**

THE physical examination of industrial employees is given a great deal of discussion, with particular reference to examination procedures as recommended by the Conference Board of Physicians in Industry.

Emphasis is placed on the general practitioner knowing the defects which are particularly important, which are quoted as follows:

"1. Markedly defective vision uncompensated by glasses, or blindess of one eye.
"2. Marked deafness of both ears.
"3. Hyperthyroidism.
"4. Myocarditis.
"5. Blood pressure over 180 systolic or 100 diastolic.
"6. Pulmonary tuberculosis; pleurisy with slight effusion.
"7. Emphysema and chronic bronchitis—asthma—fibrosis of lung.
"8. Gastric ulcer or carcinoma.
"9. Cholecystitis with or without gall-stones.
"10. Chronic appendicitis.
"11. Chronic nephritis with acute exacerbation.
"12. Gonorrhea or syphilis, especially in active stage.
"13. Chronic arthritis, especially of the spine.
"14. Ankylosis of important joints.
"15. Severe varicose veins especially with edema of leg.
"16. Chronic foot strain—deformities of foot or toes.
"17. Hernia of all types.
"18. Hypertrophy or infection of prostate.
"19. Epilepsy.
"20. Diseases of nervous system.
"21. Dental conditions suggesting foci of infection."

It is not to be assumed that any or all of these will constitute in any given instance grounds for rejection of an applicant for work. As the authors well state: "In making the initial hiring examina-

tion, the examining physician has to decide whether the physical condition of the applicant permits his working at the job to which he has been assigned by the employment department, whether his physical condition is such that some other job would be preferable, or whether or not he can work at any job. The great majority of workers are physically fit to do the jobs to which they are assigned. A small minority must be placed in selected jobs, only a very few must be rejected. The basis for rejection is that employment of the individual would constitute a danger to himself, to others, or to the company."

Examples are then given of instances when prospective employees have certain defects which would probably result in difficulty.

In considering industrial injuries, the subject of wounds receives thorough consideration along with fractures and nerve injuries—the comments and suggestions of the Reconstruction Hospital of Columbia University of New York being quoted in detail regarding the latter type of injury. Burns are also included and the tannic acid treatment is outlined in detail.

Under industrial medical service, record forms of various types are suggested and given in different tables; the minimum standards for medical service in industry as compiled by the American College of Surgeons are also given; the practicing of industrial medicine in the small factory is described; and the relationship of the industrial medical department to the community and to various social agencies is commented upon.

Industrial disease is defined simply as "one arising from and peculiar to a given occupation." The authors believe that industrial disease, at least for the most part, is a toxemia resulting from continuous exposure to some poisonous product, or to an unfavorable working environment and, therefore, logically discuss first the effects of various conditions as the causes of industrial disease. Such subjects include temperature, metabolism, ventilation and air conditioning, recirculation and odors, salt depletion, and compressed air illness.

**Dust and Pneumoconiosis**

THE importance of particle size of dust, what happens when dust is inhaled, how much of it is retained, are subjects given thorough discussion under this heading. The technique of dust determinations is also briefly explained.

Pneumoconiosis, according to the authors, was the most important industrial problem at the time their book went to press in January, 1935. Three chapters are devoted to this subject: In one there is a consideration of silica and silicosis and asbestos and asbestosis; in another, the non-disabling fibroses; and in the third, functional disability in pneumoconiosis, as well as the determination of the harmfulness of dusts.

The view of the authors is nicely expressed in the following paragraph: "Today the word pneumoconiosis includes the manifestations of all dust inhalation whether the dust is injurious or harmless; silicosis, on the other hand, presupposes a perfectly definite etiological factor, free silica or quartz, and embraces by far the greatest part of the morbid pathology for which dust inhalation is directly or indirectly responsible."

Of further interest to the physician practicing in an industrial community or doing industrial work on a full-time basis is the statement that "one must distinguish between minerals which contain pure silica like quartz, and the silicates like talc. Quartz has been proved beyond reasonable doubt to be phagocytosed slowly, to cause definite cell necrosis, cellular mummification, and to render lung tissue inordinately susceptible to tuberculosis. From the standpoint both of geology and physical chemistry, all forms of pure silica are by no means alike; neither is their physiological action alike, but we have accurate physiological data on only a few. Of the silicates so far studied only asbestos (and possibly sericite) have the specific power to produce disabling fibrosis of the lung tissue, but as yet no mineral dust other than silica has been found actually to render tissue unduly susceptible to tuberculosis. One must never lose sight of the fact that the usual cause of death in the fatal pneumoconiosis is infective tuberculosis and not tissue fibrosis. It is reasonable, therefore, always to ask what the 'free silica' content of a dust may be before deciding whether it is likely to produce fibrosis."

Supplementing these statements is a table by Thompson showing the relationship of quartz content of rock dust to the production of silicosis, and also an important outline tabulating the roentgenological changes found in silicosis together with the underlying histological conditions, prepared by Drs. Sayers, Pancoast, Pendergrass, McConnell, Sampson and Gardner.

In the second chapter on pneumoconiosis, in discussing the non-disabling fibroses, the authors state: "There are numerous industrial processes today in which men are exposed to considerable dust concentrations seemingly without harm. Industry is at last becoming alert to the possible ill effects of dust inhalation so that we are able now to take some account of stock and to state with some assurance what dusts produce disabling fibroses and what do not. . . . The pneumoconioses of inert dusts produce no symptoms. Workers exposed to these dusts continue to work into old age. If exposure has been long and dust dosage abnormally heavy, there may be some dyspnea on moderate working exertion. This is usually not severe enough to interfere with the worker's normal activities or working capacity, nor is there evidence that these dusts, *free from quartz*, predipose to tuberculosis."

In the third chapter on pneumoconiosis regarding functional disability, the work of McCann and his colleagues at Rochester is explained and commented upon. This work has reference to the use of the vital capacity in correlation with the degree of lung fibrosis in attempting to interpret the significance of the classical symptom of dyspnea.

The determination of various dusts and gases is also outlined, the techniques being briefly described. A valuable concept of the authors is as follows: "The physician whose patients work in dusty places should know the general technique of dust sampling but not be expert himself. In this country dust sampling is generally done with the impinger apparatus developed at the Bureau of Mines, Pittsburgh, where it was tested thoroughly and later simplified. * * * In interpreting dust samples the composition of the dust and not simply the quantity must be known. This composition when possible, should include individual compounds or minerals and should not simply be a chemical analysis—a dust with 50% total $SiO_2$ is not the same, physiologically, as one with 50% quartz, which is pure $SiO_2$. The physician can rarely diagnose silicosis without the complete oc-

cupational history before him—the nature of employment, physical examinations, x-ray, and dust analysis. The dust analyst, in turn, uses all possible short cuts to his answer, especially composition of the original rock or source of the dust. But he must base his findings finally upon the composition of dust which is air floated and respirable and not on the composition of the original source."

**Lead, Industrial Dermatoses, Benzol**

THE importance of lead poisoning need not be emphasized to an industrial practitioner, but recent work has shown that new developments are vital to the industrial physician: "Lead in small quantities is being ingested daily by most people. Kehoe has shown that even in isolated non-industrial communities normal individuals excrete a certain amount of lead daily. Workers in lead or where the process involves the use of lead are exposed to abnormal amounts of the metal and may suffer from lead poisoning. While in the case of exposure to tetraethyl lead, absorption is through the skin, in the majority of cases lead is inspired as a dust or fume. Although a small amount of lead may be taken in by mouth from the worker's unwashed fingers, the amount in most cases is too small to be of importance."

In the consideration of dermatoses, the U. S. Department of Labor's list of the following 12 compounds as being particularly apt to produce eczema, is cited: "Aniline and other amino compounds of benzol and its homologues; antimony and its compounds; formaldehyde; mercury and its compounds; nitroglycerine; phenol; arsenic and its compounds; bromine; chromium compounds; tar; tellurium; and turpentine."

Prevention of industrial dermatoses is outlined, including proper washing facilities, instruction of workers in preventing irritation, the use of gloves and sleeves, the use of different hand creams, thorough washing of exposed parts with non-irritating soap, and engineering methods preventing the circulation of skin irritating substances.

In the discussion of benzol and other types of gases and vapors, the classification suggested by Henderson & Haggard is cited and used. Treatment of gas poisoning and the details of artificial respiration technique are also given.

The prevention of industrial disease occupies one whole chapter and covers the various methods used for individual or personal protection, as well as general methods adaptable to groups.

**Summarized Comment**

IN PRESENTING this book to industrial physicians and others who may be interested, the authors have taken a definite forward step—in bridging over the engineering and medical relationships referable to the problems of occupational disease. The philosophy of the book clearly indicates that the industrial physician is the responsible person not only for the diagnosis and treatment of industrial maladies, but also for the continued acquisition of further enlightenment concerning the environmental etiological factors which are the causes of such types of disability. All of which does not mean that the engineer will not continue to be a valuable person, especially in his relationship to the medical fraternity—but one can never expect to make physicians out of engineers—progress lies in a greater appreciation by both the physician and engineer of the common area in which their problems overlap, and delegating to the physician a responsibility which he has heretofore not realized.

This little volume of 262 pages represents vital, condensed and clear-cut information essential to the industrial physician and the practitioner who has industrial cases. The book might well be called the BIG little book of industrial medicine and the *vade mecum* of the industrial physician.

—C. O. SAPPINGTON, M. D., DR. P. H.

# Peripheral Nerve Lesions

KAT refers to three cases of peripheral nerve lesions complicating carbon monoxide poisoning[1]. The patients presented deep infiltrations of a cartilaginous consistency in the muscles. Two of them presented marked trophic disturbances. The main theories with regard to this lesion are those assuming (1) a toxic action on the nerve trunks; (2) an asphyxia of the nerve tissue; (3) a toxic action on the blood vessels causing stasis and hemorrhage, and (4) mechanical lesions of the nerves by the abnormal position of the extremities during coma. The author attributes great importance to the infiltrations in the muscular tissue as an explanation of the pathogenesis. In his opinion, hemorrhage and reactive edema of muscles occur as a result of vascular intoxication to which a mechanical factor is added; the nerve lesions are caused by pressure on the nerve trunks or the plexuses in these extremely hard infiltrations. Under this assumption, which might be called a primarily toxic, secondarily mechanical theory, the muscular infiltrations are to be regarded as an indispensable condition for the causation of the nerve lesions.

# Control of Undulant Fever

THE control of any disease in the human that has its origin in the lower animals is easily stated: *Stop it at its source of origin.*[2] While it is believed that the weight of evidence supports the contention that, in the United States at least, undulant fever is most often contracted through contacting infected animals and their products rather than ingestion of such, we must necessarily recognize the potential danger that exists through the consumption of raw milk and its products, not only in undulant fever, but also in tuberculosis, septic sore throat and other milk-borne diseases. Eradication of tuberculosis in cattle was first agitated as an economic measure, but not until it was demonstrated to be transmissible to the human and a joint health problem did its eradication make progress. Likewise was Bang disease first prosecuted as an economic problem, but is now a matter of grave concern to all in charge of human health. The problem of mastitis in the dairy cow is now upon us and is no longer just a condition affecting the efficiency of the herd; it is a human health problem demanding our serious attention. Milk is the most universally used food commodity of mankind, and the public has a supreme right to know that every drop sold is perfectly safe for consumption. The first step in this procedure is to

1. *Nederl. tydschr. v. geneesk.*, 78: 5013-5112, November 3, 1934; abstr. *J.A.M.A.*, January 5, 1935.
2. *Illinois M. J.*, January, 1935.

see that it is produced by healthy cows, and it is equally as essential to know that the conditions under which it is produced are sanitary. It should be impossible to sell to the public any raw milk except certified, and it should be as much a duty for food inspectors to know that *it is produced* under sanitary surroundings and handled in a sanitary manner prior to reaching markets as it is for them to see that it is kept under sanitary conditions just prior to its sale to the public.

# Pre-Employment Physical Examinations

## Management's Point of View

*By* Ernest B. Lawton*
*R. H. Macy & Co., Inc.,*
*Assistant General Manager*
*in Charge of Personnel*

OUR organization is one which during normal times employs approximately 10,000 people. At the height of the Christmas peak there will be about 20,000 workers on our payroll. Occupying the prominent position which we do in the field of retailing, thousands of applicants seek employment with us. I think I can safely say that in the past 10 years it has been necessary for us to interview not less than 150,000 applicants each year. I am reasonably sure that this figure has been as high as 200,000 people during a twelve-month period. Almost every profession and skilled type of worker is represented. We must employ highly trained economists, artists, copy writers, electricians, machinists—not to mention doctors, psychologists, psychiatrists and other specially trained people.

We maintain a highly trained and skilled group of employment interviewers who are experts in analyzing and determining the qualifications which will result in successful job performance. At best, however, this process is only relatively scientific. We are still struggling in the field of psychology, psychiatry and other scientific methods of determining the less tangible aptitudes and hidden abilities of the job hunter. We have made some strides in correlating psychological tests with successful job performance, but the only truly scientific part of our employment work up to the present has been that of determining the physical fitness of the applicant.

The satisfactory solution of the problem of finding the right man for the job is of equal importance to business, to the individual, and to society. Determining the fitness of a candidate for a position in any large organization is, therefore, one of the prime requisites of any business. Mistakes in employment result in high cost and waste to business, unhappiness and insecurity to the individual, and the burdening of society with the results of unfortunate mistakes. Curative measures may be brought into play, such as compensation insurance, but it is infinitely better to use preventive measures, thus eradicating the cause and avoiding the later problem.

A business organization might be charged with being extremely selfish, cold-blooded and pecuniary in the application of physical examinations to all applicants. This seems to me a social problem rather than a part of the present discussion. I think I can show, however, that this so-called selfish viewpoint is entirely harmonious with a larger social viewpoint. To give a simple example: If four men are hired as piano movers and one of the four is incapable of holding up his corner of the piano, the result might be smashing the toes of the three other movers if the weakling were suddenly forced to let go of his corner. Compensation insurance may take care of the other three workers, but they would probably prefer to have their toes back again.

Few secretaries would deny that the gastronomic condition of their bosses is the vital factor in the happiness and efficiency of their own work.

One member of a gang "getting out of the wrong side of the bed" may affect the efficiency of the whole group. If this getting out of the wrong side of the bed is chronic and can be determined by a physical examination, many a worker's job is pleasanter and many a capitalist's profit can be written in black ink rather than in red as a result.

Although the small percentage of people who are accident prone from psychological or emotional causes cannot at the present time be quickly identified by physical examination, there is no question that the severity of accidents can be lessened by proper physical selection.

In discussing our experience in pre-employment physical examination, I would like to re-emphasize the advantages of proper physical selection in respect of:

1. Its effect upon the individual.
2. Its effect upon the organization.
3. Its effect upon the fellow workers—*and*
4. In an organization like our own, its effect upon society in general. . . . and you can readily understand what is meant by this point when I tell you that as many as 150,000 customers frequently enter our doors in one day.

Dating back to 1915, we have been one of the pioneers in pre-employment physical examinations. During this period, we have collected a vast amount of data which has been the subject of research and analysis by our Medical Department. In many cases we have reached decisions which materially changed our policies with respect to employment. For example, a study of resignations for health reasons was made, covering a period of several years. This analysis showed such a high correlation between health resignations and underweight that we changed our standards for employment as a result.

During a city wide epidemic of German measles, the great majority of Macy cases was confined to salesclerks. This data was brought to light by the Medical Department records and is evidence of the increased danger to general exposure by that part of our personnel coming in contact with the general public. Fact findings of this sort may well lead to setting up peculiar standards of physical selection related to the hazards of the particular job.

I will not attempt to go into detail regarding the ordinary prevalence of many diseases among any group of people. We can safely assume that our 150,000 applicants are subject to the ordinary prevalence of diseases, disabilities and physical tendencies. It is, therefore, an important part of our pre-employment examination to weed out the evi-

* Presented at a meeting of the Association for the Advancement of Industrial Medicine and Surgery, New York City, October 22, 1935.

dently physically unfit candidates. The fact that during the past nine years we have rejected 1585 people for poor vision, 657 people for high blood pressure and 497 for advanced heart disease has without question been a considerable factor in job success and improved health and accident records. These rejections were all made in the cases of people who had been selected for employment by the employment interviewers and, without a pre-employment physical examination, would have been placed at work.

It is also an integral part of our pre-employment physical program to apply special precautions in examining candidates for certain types of work such as food handlers, drivers, mechanics, or any jobs requiring unusual physical fitness along certain specialized lines. In addition to the regular pre-employment examination, certain types of workers are required to report for frequent re-examinations depending upon the nature of the work in which they are engaged.

**Delivery Department**

AN IMPORTANT part of our medical examination program is its use in connection with the drivers.

With that particular group, we have made noteworthy strides in the reduction of accidents—due largely to adequate physical examination and our ability to discover proneness to accidents. It doesn't take a doctor to know that a driver should be able to tell red from green. However, we do give an accurate color-blind test to all drivers. We have also tested our drivers and driver apprentices for reaction time and are convinced that this has been a major factor in accomplishing highly satisfactory results in accident frequency.

Since any scientific body must have figures to prove the point, I offer the following as indicative of what has been accomplished in reducing accidents within our delivery fleet. It should be borne in mind that these results have been accomplished during a period when the New York city streets have become increasingly crowded and the accident rate among all vehicles has been increasing at an alarming rate.

The following figures show our total accidents of every description from 1927 to 1934 inclusive, together with the number of vehicles in our fleet for each year:

| Year | Number of Accidents | Number of Vehicles |
|---|---|---|
| 1927 | 695 | 299 |
| 1928 | 494 | 350 |
| 1929 | 471 | 367 |
| 1930 | 382 | 413 |
| 1931 | 376 | 422 |
| 1932 | 216 | 427 |
| 1933 | 182 | 441 |
| 1934 | 149 | 421 |

This progressive improvement represents a change from 2.3% accidents per Macy car per year in 1927, to .35% accidents per car in 1934.

We also have in the delivery department the case of the helper on a truck who was hired for one day, without a physical examination. He sustained a bruise over his right eye, and his claim that the injury caused loss of vision in that eye was sustained, in the absence of proof to the contrary. He was awarded $4,000 for the loss of his eye. This case clearly indicates the protection to the employer which is provided through adequate physical examinations and records of the same.

**Personnel Division**

IN THE personnel division, there was the case of the experienced and responsible executive who had started to slip in her work. Perviously, she had been very thorough in carrying out all the details of her job. For no apparent reason, she had appeared to grow careless and had become prone to forget things totally. Following our regular policy of thoroughly studying such cases, she was sent to the Medical Department for a physical examination. Although previously unsuspected, the medical staff discovered marked loss of hearing that could be brought up to a satisfactory level by the use of a mechanical device which she is now wearing.

**Early Detection of Tuberculosis**

ANOTHER important part of our routine medical work is the reporting to the hospital following an illness. In one such case, a stubborn cold persisted until the Medical Department decided upon an x-ray. This x-ray revealed active tuberculosis at a very early stage, which condition had been completely unsuspected. The early detection and prompt treatment resulted in the complete cure of a valuable executive.

In summarizing, the advantages accruing to management from our medical work are the following:

1. The prevention of unjustifiable claims for compensation in cases in which conditions existed prior to employment. This is of great importance owing to the present tendency to widen the scope of the workmen's compensation law and the elastic inclusion of many chronic diseases.

2. Reduced employment, training and production expenses through the selection of applicants physically fitted for their work.

3. Prevention of prolonged disability or illness due to prompt medical attention at the onset of an illness or time of accident. In this connection, we have interesting figures for the year 1934 compared with 1930. As a result of cooperation between management and the Medical Department, the number of injuries reported increased 43% in 1934 compared with 1930. On the other hand, the number of cases losing time decreased 25%, and the number of total days lost decreased 35%. This shows what can be done under prompt, efficient medical care, as compared with the results obtained through amateur use of local safety kits.

4. Deduction in the absence rate, due to the above measures.

5. Reduction in expensive labor turnover, due to adequate medical program.

6. Protection of fellow workers and customers against infectious diseases.

7. A general increase in morale, due to the proper adapting of the individual to work which he or she can capably perform.

8. Greater success on the job, due to the security resulting from proper placement.

When it is realized that for every day lost as the result of an industrial injury our records show that 16 days are lost through illness, we can realize the importance of a general health program as contrasted with merely the ordinary safety campaign.

In addition to the advantages of our medical pro-

gram as directed to the individual patient, we should also mention that a part of our medical program concerns itself with establishing suitable standards of working conditions, such as lighting, ventilation, etc. For example, a recent problem to both the management and the Medical Department was the designing of adequate equipment to prevent the exposure of our dry cleaners to carbon tetrachloride fumes. Dog bites constitute a peculiar hazard to delivery men.

A PART of our experience in this work leads me to conclude with a very positive warning. Some years ago, it was discovered that the employes were suspicious of the Medical Department and were afraid to visit our doctors. As a result of this we have formulated a definite policy of protecting the individual against the misuse of the confidential arrangement between patient and doctor.

It is important that management accept this basic confidential relationship of physician and patient, except in cases where there is a potential hazard to others and a refusal to cooperate to eliminate this danger. When our management institutes a physical examination, because of a work problem, management is entitled to receive from the Medical Department information as to the suitability of the worker for specific types of work. Our detailed medical records are not available to management. We are sure that the considerably increasing number of voluntary visits to the Medical Department is proof of the confidence of the workers in this policy.

In closing, have you ever heard your wife say: "My god, I ordered a dozen sheets from . . . . . and they sent me a dozen shirts. Are they deaf down there?" The answer is they probably are; the employment interviewer, when talking with the applicant for a vacancy at the telephone order board, could not detect the slight hearing defect that existed.

At Macy's, the deafness of this prospective telephone operator was discovered. Hence we find her working in a competitor's organization, where there is no Medical Department. That is why Macy's has never been known to send out the wrong merchandise.

# Recent Researches

## At the University of California of Interest to Industrial Medicine

*By* ROBERT T. LEGGE, M. D.,
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*Berkeley, California*

DURING the past semester experimental research brought out certain developments which are of interest to industrial physicians. This research work was conducted in the laboratories of the University of California.

M. M. Brooks, Ph.D., in experimenting with rats found that $NaNO_2$ produced methemoglobin in vivo. On introducing injections of glucose immediately the methemoglobin was reduced to hemoglobin which can be oxygenated to oxyhemoglobin and the normal respiration continued. When glucose was injected before the $NaNO_2$ was introduced methemoglobin was prevented.

In the blood stream glucose tends to produce an oxidation reduction potential too negative to permit of the existence of methemoglobin.

These observations may be of great practical importance from a therapeutical standpoint in the treatment of methemoglobinemia in industrial poisoning cases due to aniline, nitro benzol, acetanilid, etc., by advocating the administration of glucose intravenously.

In the past year the writer became much concerned regarding certain members of the faculty and their assistants who were carrying on research work with neutrons in the physical and chemical laboratories of the University of California. Being aware that these neutrons are radioactive agents, an investigation was made as to the effect on the blood cells of these exposed research workers. The small number of cases examined in this preliminary report may be of value as they showed definitely that there was a lowering of the counts of both red and white blood cells. This piece of investigation was continued by Dr. John H. Lawrence, of the Yale Medical School, (a brother of Professor Ernest Lawrence of the Radiation Laboratories, Department of Physics, who recently developed radioactive sodium). Dr. Lawrence made studies on the comparable effects of neutron rays and x-rays as ionizing agents. He found that an x-ray beam having an ionizing effect in air equal to that of a neutron stream, has only one-tenth the ionizing effect of the neutrons on the blood of animals. Apparently the neutron rays are 10 times as powerful.

# The Traumatic Fakir

## Illustrative Cases from Personal Experience

*By* FRANK P. HAMMOND, M.D.
*Chicago*

WE HAVE chosen the term "Traumatic Fakir" in this series of articles to include malingering, part fakir, genuine fakir, and aggravation of previously existing pathology.

The frequency of occurrence and the importance of disturbing the economic equilibrium of this class of "patients" deserve more thorough study and discussion by the members of traumatic and industrial surgeons' associations.

In our discussion of the subject in successive issues of *Industrial Medicine,** we shall give our end results in bona fide cases, passing through our files.

In Mohammedan countries, the fakir, in general, is a religious mendicant. The mendicants are divided into two classes—the orthodox, or those "within the law," and the heterodox, or those "without the law." The Hindu fakirs are probably the most expert jugglers in the world. They appear to be adept in sleight of hand, in hypnotism, in ventriloquism, in producing illusions, and in controlling organic reactions by voluntary effort.

The fakir still remains not an unimportant part of the activities of peoples in scientifically backward countries. Their number and activities are much less in scientifically progressive countries, including the United States, but nevertheless they are here, and are plying their "craft" upon the unwary and the uneducated.

To interpret properly the picture we wish to

* This is the first of three articles by Dr. Hammond. The second will appear in the next issue of *Industrial Medicine.*

draw, one must keep in mind that the fakir is always "out for the money." Again, the fakir becomes so imbued in his sorcery that he actually believes that he is rendering good and valued services for the stipend received.

In our opinion there is no department of scientific medicine where the fakir is so constantly and everlastingly present as in the specialty of traumatic and industrial surgery. *This is so* because in no other specialty is the dominant factor associated with rehabilitation and recovery-money!

Every trauma case is a potential litigation case: compensation, public liability and personal liability.

Since money is the dominant factor, the injured, over a short or prolonged period of convalescence believes his complaints and claims are genuine. Here comes in the *honesty*. His complaints and claims, though false and exaggerated, have been repeated mentally and orally so many thousands of times that he becomes oblivious to the truth, and affirms them in no uncertain terms: "demonstrating" his "honesty."

The industrial surgeon is called upon to determine and decide whether the "symptoms" and complaints are real or false. The traumatic and industrial surgeon, because of his special training and experience in caring for numerous similar cases, must be the one to decide. Why? Because the Doctor understands the reaction of human tissues to injury—the pathology, healing processes and end results. We use this infallible rule: "When the symptoms and complaints do not tally with the findings, we doubt the claims."

The traumatic and industrial surgeon, first of all, must be honest with all concerned: *first*, with the injured or claimant; *second*, with the employer or defendant; and *third*, with the insurance carrier. Professional dignity and self respect are lost when he allows his opinion to be warped by false claims, sympathy, or the conscious (or unconscious) desire to increase the fee.

A case in point: J. D., age 32, was sent to our office at 2:30 p. m., by a hotel manager because he claimed having swallowed a "nail" from food while eating his dinner.

THE HISTORY: While eating dinner the night before he felt a scratching and sticking sensation while swallowing some apple pie. He said nothing about it to the hotel management until the following afternoon, but felt sticking pains in his abdomen all night and the next day. He voluntarily asked for an x-ray. That's all he wanted; he said he must leave early in the evening for St. Louis.

THE FINDINGS: A well-developed, well-nourished young man, apparently in some distress. He refused to disrobe for abdominal and rectal examination because, he said, "I am in a hurry; all I want is an x-ray. I must leave for St. Louis as soon as I can get some urgent business attended to." Politely and with reservations we acquiesced.

The following events rapidly developed:

We telephoned the hospital x-ray department for an immediate flat plate of the alimentary tract; gave J. D. requisition slip for radiograms.

As soon as he left the office two telephone conversations of importance ensued.

A. The hospital radiologist was told as soon as the pictures could be visualized to telephone us the findings—and, more important, to keep the "patient" away from hearing distance and "stall" for time.

B. The insurance carrier was asked for its top "detective" adjuster to come to our office at once, for "we think we have a fakir."

The radiologist phones: "Small nail in *lower* rectum." We requested him to go slow, say nothing, and hold the "patient" until we called back.

The insurance carrier phoned: "Adjuster will be at your office at 3:30 to 3:45."

We phoned the radiologist: "Give the 'patient' slip addressed to us, 'nail in bowel'."

J. D. was back in the office, partially disrobed on a table.

The reception room attendance announced Mr. Blank.

We told J. D. there was a gentleman from the hotel to see him. He remonstrated: "I don't want to see anybody associated with the hotel."

Just then the adjuster stepped into the outer office, and we introduced him to J. D., bringing them face to face.

Within 10 minutes the adjuster had the man's confession that he himself inserted the nail, anticipating $100 or so to help him on his way to the south.

He was photographed and otherwise recorded, to protect against free propagation of his trade.

J. D.'s history, actions and story did not "ring true."

Traumatic and industrial surgeons hold a key position in suspecting, detecting, and pointing out fakirs.

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# Silicosis in Porcelain Workers

JONSSON'S report* is based on roentgenologic studies on 236 porcelain workers. In the mildest cases there is only a diffuse increase in the perivascular connective tissue, but later on there appear nodules consisting of "dust cells" and hyaline connective tissue. To begin with these nodules are the size of a pin head, but they gradually become larger and attain a diameter of from 4 mm. to 5 mm. They increase in number, and finally large indurated areas develop, which have a strong tendency to contract. In the later stages of silicosis emphysema develops between the fibrotic areas. A common condition following these pulmonary changes is hypertrophy and dilatation of the heart, especially of the right ventricle. The silicotic changes occur most abundantly in the middle parts of the lungs; i. e., in the inferior part of the superior lobe and the superior part of the inferior lobe. The roentgenogram in silicosis reflects rather clearly the pathologic anatomic changes. From the roentgenologic point of view it is usual to classify the cases of silicosis into three stages. Stage I is characterized by lesions which give a roentgenogram that shows delicate finely flecked shadows in the center of the lung fields and an increase in the fine shadows from the hilus. To stage II are assigned cases with larger nodular shadows, and to stage III cases exhibiting large fibrotic areas and advanced contraction. The author's material is distributed over the different groups as follows: no signs of silicosis, 88 cases; suspected silicosis, 11 cases; silicosis stage I, 81 cases; silicosis stage II, 37 cases, and silicosis stage III, 19 cases. In stage III the hilus shadows are usually no longer visible or else they are light and vague. Various explana-

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* *Acta Radiologica*, Stockholm (June, 1935; Abstr. *J.A.M.A.* (August 10, 1935).

tions have been given of this phenomenon. The author thinks that the disappearance of the hilus shadows in stage III is due to the fact that the silicon dust gives rise to the same changes in the hilus as in the parenchyma; namely, extreme contraction. That this could contribute to a reduction in the hilus shadows seems probable. Moreover, owing to the extreme shrinkage in the pulmonary parenchyma, strong traction is exerted on all parts of the lungs in the direction of the center of contraction, which is generally situated in the posterior lateral parts of the lungs on a level with or perhaps above, the hilus. The contraction causes extreme deformation of the lungs and of the mediastinum, and thus the pulmonary hilus is likewise changed in form and position. In all the severe cases of silicosis observed by the author, the elements which produce the normal hilus shadows are dislocated. Under such circumstances the normal configuration of the hilus is entirely changed and is consequently difficult to recognize in the roentgenogram. The lateral picture is especially characteristic in silicosis. The changes are chiefly situated in the posterior parts of the lungs, corresponding to the areas of distribution of two specific bronchi.

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# Interpreting the Occupational Diseases Enigma

*By* C. O. Sappington, M. D., Dr. P. H.*
*Consulting Industrial Hygienist*
*Chicago, Illinois*

INTERPRETATION has become the most disturbing and at the same time the most significant phenomenon of all human relationships.

"I am surprised!" exclaimed Mrs. Webster as she came upon Noah kissing the maid. "Oh, no, I am surprised; you are astonished," he rejoined.

There lie within this little incident and its description in words, all the potentialities of the present and future occupational disease difficulties; because for lack of proper interpretation and adequate reasoning, occupational diseases will probably continue to produce surprising and astonishing situations in the future.

Why has the occupational disease problem caused a stymie on the insurance golf links? Because of the great lack of qualified interpreters—interpreters in various fields, medical, engineering, legal, insurance and compensation.

The principle of interpretation assumes that the interpreter understands both languages, which means that he is on familiar terms with both sides of the question at issue. In the application of this principle to the occupational disease question, it means that there is one who is qualified and understands what constitutes an occupational disease hazard in the industrial environment: how it can be measured—how one may identify injurious conditions—what conditions are dangerous and what are not; and on the other hand, it also means that the effects that such conditions may have upon the human body in the production of disability and disease can be properly evaluated and assessed. Eliciting this principle further, it also constitutes the ability to translate, if you please, such hazardous conditions and their injurious effects into terms of insurance underwriting and carriage, in a successful way. We thus start at the very beginning of the problem in industry, carry it through the engineering and medical relationships, and then on into the underwriting, insurance and compensation phases.

Too often in the assessment of an occupational disease potentiality reliance has been vested either in an inspection engineer who may be thoroughly capable of estimating and measuring industrial conditions by visual means (as far as that goes), or a physician who may be quite well qualified only in the diagnosis of occupational disease; also in the underwriter and the compensation expert who may be thoroughly qualified by experience to assess conditions relating to accidental injuries, but whose experience in occupational disease difficulties has been somewhat lacking.

This lack of interpretative facilities reminds one of a friend who spent the night with a farmer. The next morning he appeared downstairs with a black eye. "How did you get that?" asked the farmer in surprise. "Oh, I just happened to fall in the guest chamber, that's all," answered the visitor. "Gee! you didn't break it, did you?" anxiously inquired the farmer.

Glenn Frank has stated so forcibly the major issues of this question that I am going to quote from him at length: "The future of America is in the hands of two men—the investigator and the interpreter. We shall never lack for the administrator, the third man needed to complete this trinity of social servants. And we have an ample supply of investigators, but there is a shortage of reliable and responsible interpreters, men who can effectively play mediator between specialist and layman. The practical value of every social invention or material discovery depends upon its being adequately interpreted to the masses. Science owes its effective ministry as much to the interpretative mind as to the creative mind. The knowledge of mankind is advanced by the investigator, but the investigator is not always the best interpreter of his discoveries. Rarely, in fact, do the genius for exploration and the genius for exposition meet in the same mind. Many negro mammies of the south can make a strawberry shortcake that would tempt the appetite of the gods, but they might cut sorry figures as domestic science lecturers. The interpreter stands between the layman, whose knowledge of all things is indefinite, and the investigator whose knowledge of one thing is authoritative. The investigator advances knowledge. The interpreter advances progress. History affords abundant evidence that civilization has advanced in direct ratio to the efficiency with which the thought of the thinkers has been translated into the language of the workers. Democracy of politics depends upon democracy of thought. 'When the interval between intellectual classes and the practical classes is too great,' says Buckle, 'the former will possess no influence, the latter will reap no benefit.' A dozen fields of thought are today congested with knowledge that the physical and social sciences have unearthed and the whole tone and temper of American life can be lifted by putting this knowledge into general circulation. But where are the interpreters with the training and the willingness to think their way through this knowledge and

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* Address delivered at the annual joint convention of the International Association of Casualty and Surety Underwriters and the National Association of Casualty and Surety Agents, at White Sulphur Springs, West Virginia, Wednesday, October 9, 1935.

translate it into the language of the street? I raise the recruiting trumpet for the interpreters."

BEFORE going on to more abstract statements which are really conclusions, perhaps some personal experiences may be briefly cited as examples of the lack of interpretative knowledge:

A manufacturing organization which made use of lead in its product, in a process in which it was necessary to maintain the lead in a molten condition in large pots, was desirous of getting occupational disease coverage in a state where lead poisoning was compensable according to law. The manager had previously been in conference with insurance company representatives and had had a visual inspection made of his plant by engineers, who told him that in order to get his insurance it would be necessary for him to install an expensive system of exhaust ventilation which would remove the particles and fumes of lead from the air. This seemed perfectly natural, but the manager was a little puzzled as to why he should install a ventilating system when he did not know if there were really lead particles in the air sufficient to cause lead poisoning. He asked, therefore, if there were not some means of measuring the possible hazard and finding out how much lead there was in the air breathed by the employees. He was referred to a consultant who could do this work, and in due time a study of the quantitative amounts of lead in the air during different processes and at different points, was made. The results of this study indicated that no lead hazard existed. Accordingly the insurance was underwritten and the manufacturer today possesses a record of the quantitative analyses in his files; he was also able to get his insurance and this information at a much lower cost than the expense an exhaust ventilation system would have entailed, had he taken the original advice of the engineers of the insurance company. Do not misinterpret my meaning here —exhaust ventilation systems and devices are invaluable for specific uses, but should not be haphazardly and indiscriminately recommended unless the indications for installation are definitely known, and furthermore they must be periodically checked for efficiency.

On another occasion, in the investigation of possible health hazards and during a mere visual inspection of a plant, a chemical engineer and I were looking at a process where the waste came away from a reverbatory furnace in a so-called stream of hot slag coming in contact with water. The engineer turned to me and said he thought that we should make an investigation as to the amount of carbon monoxide and methane in the air in this location, for said he, both of these are dangerous to health. My reply was that I was concerned about carbon monoxide, but that I did not have any anxiety about methane in the air, since this gas is inert and has no physiological action upon the human body, although it offers an explosion hazard in certain concentrations.

In the course of a visual inspection in a plant where dipping processes occur and parts are dipped into molten aluminum, an engineering inspector reported to his company that this constituted a health hazard, because the employees would be breathing fumes of aluminum. He apparently did not know that the breathing of aluminum fumes does not produce a toxic effect.

It has often been my privilege to review findings in regard to chest films and also the physical examination results of employees who are being surveyed routinely without complaint or in cases where occupational disease is alleged. In many instances it has been found that silicosis is diagnosed according to findings on the film, when such manifestations lie well within the limits of normal structure. It has similarly been observed that there are a considerable number of instances where the physical findings have been misinterpreted and the person either diagnosed as having silicosis or judged as a poor risk for further dust exposure.

Experience has been similar in the examination of persons who have alleged lead poisoning, or who are, or have been, or are going to continue to be, exposed to lead in manufacturing processes.

In another instance, where potentially dangerous substances were handled in the manufacture of various products, the management thought that a silicosis hazard would be found in certain locations in the plant, and that other points would be free from such hazard. After a dust study and survey had been made of these locations, the conditions were found to be actually reversed, for we did find hazardous conditions in locations where they had been thought to be absent by the management, and contrariwise, health hazards were found to be non-existent at the points suspected by the management.

These and similar other experiences together with corroborative evidence clearly indicate that a representative group of companies have turned down good business and have put business on their books which was really a poor risk.

There is a middle ground, however, there being instances of where possible health hazards may be measured and found lacking and the business acceptable; there are also instances of where a hazard may exist, but which may be controlled by various methods and devices, which are not prohibitive. It is in this overlapping area that occupational disease insurance carriage may be made profitable and successful, when controlled by scientific investigations and proper interpretation.

Several years ago in addressing a meeting of the Michigan Association of Industrial Physicians and Surgeons at Detroit, I had the courage to work out an allegorical reference in regard to industrial medicine, which still holds today and, therefore, I am quoting it to you: "Industrial medicine, a struggling youth of 20 years, comes to us complaining of headache, palpitation of the heart, pains in the muscles and joints, loss of weight, and a feeling of general weakness.

"The family and personal history showed gradual development of activities with the usual childhood and adolescent difficulties.

"In the physical examination of this patient, let us assume that the medical profession represents the head. We find that the eyes show a considerable degree of myopia (short-sightedness); the hearing is definitely impaired in both ears; a further examination of the right eye shows the presence of a sarcoma of the fee-splitting variety. Mental tests give the impression that there has been lack of coordinative planning and administration.

"Let the heart represent industrial executives. Here there is a definite valvular leakage and there are 'missed beats' and palpitation on the slightest exertion.

"The lungs correspond to industrial commissions and boards. The findings show considerable dullness, whispered bronchophony and many fine rales at both apices.

"The nervous system is represented by the insurance carriers. Examination shows the reflexes exaggerated at one time and inhibited at others; the pupils are unequal and sluggish in action; the Babinski and Romberg reflexes are positive, and the ankle clonus is increased.

"The working population is synonymous with the muscular and skeletal systems. Much muscular incoordination is evident; the posture is poor; there is a definite atrophy of certain sets of muscles and hypertrophy of others.

"Without attempting to carry the allegorical application any further and submit laboratory findings which would probably only confirm this brief presentation of the physical findings, I think that we can safely assume that this is a fair clinical picture of our young patient, industrial medicine of today."

BUT the situation is not hopeless, and much more can be done to improve it than has been done in the past. What means and methods have we at our disposal, and how shall we apply them?

In answer to these questions, we do have methods now available and judged competent by the authorities to measure scientifically the major health hazards in industry today. We also have methods at our disposal for evaluating medically and diagnostically the effects of these exposures upon the human body. We should be under no illusion about these procedures: they are valuable but only in trained hands and when used by the minds of persons who are particularly qualified and have had experience with them, knowing their limitations as well as their advantages. We are thus able to say with a reasonable degree of certainty whether or not any given exposure in industry constitutes a health hazard and would work injury upon exposed employees in the future. We are also able to say whether or not there has been such an effect upon employees, as indicated by the physical examination findings, supplemented by clinical laboratory tests, and such other laboratory work as is necessary to come to a conclusion.

The underwriting and compensation departments of the insurance companies who are going to carry occupational disease risks should demand the facts relative to occupational exposure and physical effects, as manifested by engineering and medical data. But they should not stop there; there should be intelligent interpretation of these data and translation of them into terms of underwriting value, so that the risk may be properly rated and upon that rating be judiciously underwritten. There is no bluffing in this game, for this is not poker; but I take it that the insurance companies, although playing a gambling game, in fact, gambling upon the issue as to whether any one of a given group will develop occupational disease, are sincerely and vitally interested in getting the facts relative to such possibilities. Perhaps the following story is illustrative of many situations in the underwriting of occupational disease in previous years: An officer stopped a motorist, took out his book and poised his stubby pencil. "What's yer name?" he inquired gruffly. "John Smith." "Yer real name," bawled the officer, who had been tricked only the day before. "Well, then, put me down as William Shakespeare." "That's better. You can't fool me with that Smith stuff."

As distasteful as it may seem to be to say so, the insurance companies have been repeatedly fooling themselves by placing too much reliance upon visual inspection in the estimation of occupational disease hazards; the reason for this probably lies in the fact that this system was successfully and still is successfully used in the rating of industrial injury hazards. But an occupational disease hazard is one which is often hidden; in fact, such hazards may be properly spoken of as "hidden hazards." You cannot smell carbon monoxide, you cannot see lead in the air, nor can you by looking at a cloud of dust approximate its concentration or mineralogical content. We need here to use scientific methods of quantitative determinations, and again after getting these quantitative determinations interpret intelligently the results and apply them to each individual situation in industry, before arriving at any conclusion as to what the hazard may be, if any, and then translate it into writing terms.

By the same token, we can never assume that because potentially dangerous substances are used in manufacturing processes a hazard really exists. This has been the foundation for what we have previously called "missed business."

I think that you can now see the real necessity for having qualified interpreters—men who with peculiar and proper training and experience can evaluate intelligently what happens in industry or what may happen, by an assessment of the industrial environment scientifically, and further, follow through the medical evidence as to what has happened and also as to what may take place in the future. I have indicated some of the difficulties, but now wish to call your attention to the special adaptation of the industrial physical examination to occupational disease problems.

It has seemed to me that the regular routine physical examination must undergo considerable adjustment before it can be properly applied to occupational disease potentialities, in the routine examination before employment and also during employment on hazardous jobs. The physician surely should have in mind those conditions and defects which may become aggravated by the specific exposure into which the employee is going or has been. The results of the physical examination should always be interpreted in the light of the possibility of industrial environment affecting the exposed employee. In other words, the physician should take into account particularly the nature and severity of the hazard presented in evaluating the defects or abnormal conditions found on physical examination, in terms of the occupational exposure.

This would appear to be a more intelligent application of the industrial physical examination than has heretofore been widely and generally accomplished.

Successfully to apply these principles, the examining physician should be able to give an intelligent answer to the following questions: (1) Do you know the nature and severity of the occupational hazard into which the examinee is going? (2) Are you satisfied that the examinee does not possess any abnormal condition or defects which might be aggravated by his future occupational exposure? (3) Do you know the nature of pro-

tective devices which are provided for the use of the employee, and whether such devices are functioning properly?

Through intelligent interpretative comments in answer to these questions the physician can serve industry much more efficiently in the future than has usually occurred in the past.

Up to this point I have not mentioned prevention which is to me the keystone of all occupational disease work and is far more significant than any other phase in the field of industrial medicine and hygiene. When I speak of prevention I cannot help but believe that we are in an evolutionary period regarding occupational diseases. If we look back upon our experience with fires, we shall find a prototype of this evolutionary process. In the beginning, there was no fire insurance and great losses were suffered accordingly. Eventually, however, a system was provided by which one could insure against the occurrence of fire and losses resulting therefrom. The people, however, discovered that in many cases, it was not possible to recover the total losses suffered. After a number of years of this sort of experiece, someone finally developed the idea that fire prevention was less costly in the end than expecting to recover losses through insurance, although it was advisable to both carry coverage and prevent fires. Today, therefore, we have developed many methods for the prevention of fire, as well as improving upon our ways of fighting fires.

We can draw a similar comparative analogy between the evolutionary processes of occupational diseases and the evolutionary processes of accidental injuries. Time was (and probably still is in some quarters) when those in authority believed (and may still believe) that the effects of accidental injuries may be fully covered by insurance.

This wrong conception, however, has gradually given way to the principle of accident prevention, which, while not fully developed, has gone a long way since its beginning.

If I am not very much mistaken, we shall probably have to learn the same lessons in occupational diseases that have been previously taught to us regarding fires and accidental injuries. For many years I have contended that the prevention of occupational diseases was the most important principle of the whole problem. Although it may yet require a number of years for this principle to be sufficiently realized, I believe that ultimately the experiences through which we pass in the future years will be greatly instrumental in showing us that prevention is by far the most economical procedure, viewed from any angle.

I take it that the insurance companies are most vitally interested in the prevention of occupational diseases, for the very essence of good insurance and profitable business in insurance is the prevention of the contingencies which may arise and make it necessary to draw upon the premium, or upon the reserve. The same methods for evaluating health hazards in industry through engineering and medical supervision and procedures are also available to us for use in preventing occupational diseases. And it is by the amassing of continuous records as to cause and effect relationships, that we shall finally place the underwriting of occupational disease risks and the prevention of occupational disease itself upon a definite actuarial and scientific basis.

AND now let me make a few concrete suggestions which I believe can be made the basis for improving the present enigmatic and puzzling occupational disease situation:

1. That an advisory board on occupational disease risks be appointed in each insurance company, this board to consist of representatives of the underwriting, compensation, inspection and engineering, and legal departments, together with a competent representative of the medical profession who is able to interpret in understandable terms the nature of a given industrial hazard and its effects upon the human body. This board should have regular and periodic meetings for exchange of information by its members and come to definite conclusions regarding specific examples of industrial underwriting.

2. The institution of regular and periodic lectures and informal discussions, separately for the medical men, engineers and inspectors, and for the underwriting and compensation experts in each company. These formal or informal presentations should be given by qualified and competent industrial hygienists who understand the proper interpretation of data, both engineering and medical, and who are able to make suggestion as to their applicability for underwriting purposes.

3. The regular publication of a question-and-answer column in insurance company papers. This is one of the methods of disseminating information informally regarding occupational disease problems.

4. The gradual building up of a rating system in which the rating, compensation and underwriting departments shall correlate information with the engineering, inspection and medical groups, the objective being a rating plan which can be intelligently applied to underwriting.

5. The continuous amassing of all possible information regarding scientific measurement of industrial exposures of various types and coordinating and integrating with this the medical findings, so that as a background for intelligent underwriting, these cause-and-effect relationships can form an invaluable body of data useful for years to come.

6. Finally, the preparation of standard files of procedure for each department concerned in this work, which may grow into manuals of instructions. This eventuality is contingent of course upon gathering a great body of data which will form the basis for abstract conclusions which can be set down for guidance.

I hope that I am neither optimistic nor pessimistic. Nor do I believe that this group of problems is a sufficient cause either for hysteria or for smugness and complacency. I have this faith in the insurance fraternity, and in the engineering and medical professions: that such a degree of interlocking and reciprocity of effort will be attained that stabilization will result. I believe that there is an intelligent middle ground, and contrary to the story about the teacher and the pupil, which I am about to tell, I believe that you can see the real issues: Said the teacher to the pupil, "Now if I lay three eggs here and five eggs there, how many eggs will I have?" To which the pupil replied: "I don't think you can do it." I have the temerity to assert that you as leaders in the insurance fraternity can make five and three equal eight. And that too is a matter of interpretation!

# Pre-Employment Examinations

*—The Point of View of Labor—*

*by*

MATTHEW WOLL
*President, The Union Labor Life Insurance Company,*
*Vice-President, American Federation of Labor*

PRE-EMPLOYMENT and subsequent periodical physical examinations of employees have excited the fears and aroused the opposition of labor because the practice has been found detrimental to the future enocomic security of many wage earners. While the practice may have had at its inception a humanitarian motive or desire, its later observance and extension, under present day specialized personnel management and industrial medical practices, indicate clearly that the main purpose and almost sole objective is to eliminate from employment the worker regarded as a potential risk from a medicolegal standpoint. Curious as it may seem, employers were little concerned about the physical condition of their employees until workmen's compensation acts were adopted. Prior to that time they manifested little, if any, concern regarding the physical condition of employees. Then they regarded more particularly the common legal defenses of assumption of risks, fellow-servants, contributory negligence, etc. With the coming of compensation acts a new interest was aroused in the physical condition of prospective employees.

A careful review of pamphlets, papers and arguments offered in favor of pre-employment physical examinations indicates clearly that it is not a question of whether or not the prospective employee shall be able to pass some reasonable test as to his physical ability to perform the duties incumbent to the position sought, that he shall have adequate mentality to accomplish his work, sufficient eyesight to function under a reasonable degree of natural or artificial lighting, hearing to receive and understand orders, etc.; neither is the examination for the purpose, at least not primarily, of the prospective employee being assigned to duties within the scope of his characteristics, abilities, or the usual limitations. That would, in a large measure, be the duty of the employment manager.

The employment manager (or the foreman or employer in a small plant) picks and chooses his personnel in more or less haphazard fashion. To argue that the present selective methods are not subject to improvement would be folly. Supposedly at least, the prospective employee must qualify to perform more or less specific duties. His physique, mentality, and craftsmanship, as noted by the employment manager, govern in a majority of cases. Underlying these characteristics are other fundamental qualifications which play an important part in industry.

Possibly or probably, as you choose, these basic factors in the human element of production must be given more attention than heretofore.

Should we be logical in attempting an analysis of industry we would place management first on our questionnaire and ask: What standards are applied to management personnel? Have the chief executives and their assistants been subjected to and passed pre-industrial physical examinations and other tests as to financial ability, scientific and technical knowledge, business acumen, sympathetic understanding of human problems, etc?

If labor enters the employment of a specific individual, or a related group of employers, what guaranty is offered as to continuity of employment, wages, safety and well being—and many other reasonable specifications? Surely the inquiry is pertinent, if even-handed justice is to be the desired qualification.

In 1933 there were 20,307 commercial business failures, with $502,831,000 liabilities, in the United States. May it be said these failures are due largely because *industry* had not observed the *very rules suggested to be imposed upon labor?* At least the question is worthy of examination.

During the same period more than 16,000 workers lost their lives (and a large, but unknown, number died or were incapacitated because of occupational disease) and a known 300,000 others were permanently or temporarily incapacitated for work because of industrial accidents. Some billions of dollars were wasted because of industrial accidents due to laxness in management. A very great percentage of these mishaps could and should have been prevented or avoided. The major share of these billions of dollars and all of the pain and suffering was borne by labor.

Aside from the question of responsibility, and setting aside for the moment the unequal division of monetary charges, it will be conceded that the price paid is a very great one and that correction is imperative.

It would seem that an answer might logically be found through analysis of known present conditions, with both employer and employee recognizing certain specific duties as obligatory. Logically, there should be some basic and fundamental structure so designed as to recognize the functioning elements upon mutually satisfactory terms. Is not the solution to be found in cooperation between organized management, organized labor, and organized medicine? So much, in brief, for theory!

In practice we do not find anything remotely approaching the equalizing of industrial mutuality, either in duties, rewards, or handicaps. If an enterprise is successful we find that labor's profits therefrom are unequal to those of management and ownership. If unsuccessful, labor again suffers in unequal proportion.

Among the inequalities—and consequent injustices—which labor faces is that of partiality in selection. Industry demands not an average but a preference, taking from the ranks of labor the younger, the best in physique and health, the most docile, for preferred employment. Craftsmanship or trained ability which might, in a better balanced system, be of prime service and value to industry, unless it also contain certain elements which are foreign to the specific duties of employ-

ment, is not regarded as desirable by employers.

Labor is now asked to acquiesce in more detailed selective processes as a pre-employment requisite. Indeed, industry now asks that a complete life history be given or formulated of each individual approaching an employment office, seeking the privilege to earn his daily bread.

The worker may have spent years in acquiring craftsmanship, he may have labored faithfully for a long period that industry might prosper and, individually or as a group, have made heavy contributions in health or functioning ability, only to find that all of this goes for naught—that industry refuses to recognize its inherent obligation of paying for its own shortcomings and that it again throws an unequal share of the burden on the workers.

### What Constitutes the Pre-Employment Physical Examination

WHAT would constitute the proposed pre-employment physical examination, and how intimately would it touch the individual?

The medical director of a large mercantile establishment in New York City reports his experience in pre-employment physical examinations: "Out of 1,000 unselected applicants for employment 16 would be generally below par to an extent which would make them unsatisfactory; two will have some extensive skin disease, one of which will be infectious; two or three a chronic ear disease with marked loss of hearing in one; 14 will have poor vision which cannot be corrected; six very bad teeth; 23 will have badly infected tonsils or sinus; seven (if men) a well-developed hernia; six of them will have some disability of the joints; six high blood pressure; four fairly advanced heart disease; about 12, if carefully examined, will be found tubercular; between 20 and 100 will have syphilis; six some general disease; including epilepsy, cancer, anemia and diabetes, and three will have well-developed varicose veins. Several of these conditions may be found, of course, in the same individual."

You will probably agree that the examinations upon which these figures were based indicate thoroughness. We have no reason to doubt the authenticity of the figures. As the medical director just quoted did not set forth the details of his examination, let us turn to another source for authority as to what is necessary in such a procedure.

Quoting the claim manager of a large casualty company on the subject of physical examination of workers: "A proper occupational history involves a complete record of the individual's industrial employment. It should include the duration of each job, with details as to the type of work that many involve exposure to dust. Where dust exists, the kind of dust should be determined by consultation with the employer."

Another authority, speaking on the same subject, says: "The history is most essential in determining this disease (silicosis) and must start from the age at which the individual began work. We must know the type of work he has done and the length of time he has spent on each job. *It is not enough to go back a few years in his life. * * * In my opinion the history is as important as the motive in a murder case.*" The same authority remarks: "*We cannot make a diagnosis from physical findings alone.*"

While the foregoing deal specifically with dusty occupations it is not difficult to apply the same reasoning to other employments. Certainly there is a dust, gas or fume hazard in a great number of industrial occupations or processes, with consequent potential or actual hazards to the health and well being of the employee, and, from what has been said regarding a worker's "history," examinations are designed to cover every possible major feature of occupational exposure.

The thoroughness of advocated physical examinations and "histories," as noted by one authority, is set forth in some detail because, he says: "It is estimated that 75% of all tuberculosis is acquired before the age of 15. If a person is comparatively young, say around 30 years of age, and at some time during his life has contracted tuberculosis, which has become non-active and walled off by the connective tissue barrier (of the lungs), the silicotic poison formed, exerting its influence on the outer wall, and the action of the bacilli from within, often succeed in breaking through that defense. The tubercule bacilli are then liberated within the lung tissues and, meeting little or no resistence, *spread rapidly and usually cause a fatal ending.* If that protective barrier of connective tissue was sufficiently strong and tough to resist the action of the toxin no particular harm would result."

Scores of other authorities might be quoted, but perhaps enough has been said to indicate what is meant by a physical examination to answer intelligently our first question "What have the authorities in mind when they advocate pre-employment physical examination?"

To anyone acquainted with industrial conditions and employment practices the pre-employment physical examination, together with the "history" that is "*as important as the motive in a murder case,*" could only result in a condition of peonage and of abject poverty for a large number of our industrial workers.

### Who Is To Make The Physical Examinations?

THE answer to the question "Who is to make the physical examinations?" is obvious. A doctor. But what doctor? There are probably as many varieties and grades of doctors as there are varieties in all other walks of life.

Civil employees of the United States are covered by workmen's compensation, administered by the United States Employees' Compensation Commission. Statistics kept by this Commission are complete and understandable. A study of these records and their comparison with private insurance-carrier records is illuminating.

These governmental employees have passed physical examinations and at their entrance were certainly as healthy as similar workers in private industry. Yet we find that approximately 8% of all workmen's compensation cases coming before the Commission were due to occupational disease. Private industry, as shown by its statisical record, indicates less than 1% of workmen's compensation recovery, taking the country as a whole.

Care and medical services offered the governmental employees suffering from accident or occupational disease cost Uncle Sam approximately half as much as did compensation awards. This amount exceeds the highest *estimate* advanced by private insurance carriers by at least 20%.

Compensation awards actually paid by the gov-

rnment, and all of it goes to the injured workers or in fatal cases to his dependents, will probably double those paid by private insurance carriers, using averages in both cases.

In governmental service labor knows what agency will make the physical examination and knows also who will pass upon disabilities, if suffered, and who will make the awards and upon what basis. Can any employee in private service look forward to an even approximate degree of such protection?

No such conditions exist in private employment. While it would be of interest to direct attention to some particular group, labor does not rest its case on the findings of any group of so-called experts. It points to thousands upon thousands of decisions rendered upon the findings of doctors—all sorts of doctors, medical men of the highest professional standing and of unimpeachable character, family physicians with alleged leanings toward the injured worker, etc. One has but to read the reports and findings of official state investigating commissions in New York, Pennsylvania, Massachusetts—everywhere such an investigation has been made—to reach the same uniform and emphatic conclusions that were expressed by these commissions: that the doctors were mistaken in their conclusions when they approved the compensation awards in settlement cases. The commissions also found that it was too late to reopen the cases. The thousands upon thousands of mistaken diagnoses and the consequent injustices to the injured workers and their families are matters of official history.

What labor wants to know is "Whom can we trust to make pre-employment physical examinations, if such are to be made?" The medical men we have relied upon in the past have not proved competent enough or honest enough or painstaking enough to meet the need. The only medical men we know who have even in part qualified as impartial and competent are those doctors making examinations for our government. Is labor to be forced to the conclusion of having the government provide doctors in private industry?

In legislation recently proposed we find the suggestion that state medical boards be set up and that the duty of physical examinations be delegated to such bodies — with the rather remarkable proviso attached that to such medical boards should be delegated all the powers now vested in the Workmen's Compensation Commissions in the fixing of awards in occupational disease cases. That is, medical boards would not only examine workmen, but formulate rules for their observance in industry and, later on, fix awards—*if any*. Of course, were this policy carried out, there could be no awards, because a workman suffering from an occupational disease must necessarily have "violated the rules" as laid down by the Medical Board. If he had "obeyed the rules", *he could not have been exposed.* Or else the board rules were at fault.

But try to get a medical board to acknowledge that sort of fault!

This simple expedient of making a Medical Board perform the triple functions of a legislative body, an administrative commission, and a judicial tribunal would seem ridiculous were it not for its attempted acceptance; and, in at least one state, an accomplished fact.

**Who Is To Pay For Examinations?**

I THINK the answer is obvious. Under the Bureau Rating system the examination will be part of the "credits" allowed the insured and the penalties levied against the employer who does not send his men for pre-employment examinations (and for re-examination) to an "approved" agency, doctor, or other facility.

Under the medical board system this will often become *a duty of the state.*

The question of paying for medical examinations is carefully provided for, although obliquely. Payment will come through increased insurance coverage rates and higher charges. Later this charge will be assessed against wages by making it difficult if not impossible to secure employment or change employment without a clearance which only the employer can give.

**Who Is To Keep The Record?**

THE employer or his agent—be it doctor, clinic, or state agency—after making an examination (pre- or post-employment) will claim the record as the property of the agency making and paying for the same. Where statutes have been proposed on this subject the record is to become a confidential one, if made by the state, and *may not be revealed under penalty.* Where the record is a private one the worker does not know and will not have access to it.

After being turned inside out, both mentally and physically, the worker may not inform himself as to his real or alleged disabilities.

In practical effect this is akin to a legalized blacklist!

If you think this an extreme view please read the Massachusettes State report on foundry employees. In this matter some 40 men in one plant were examined by an insurance company, found to have some degree of alleged disability and discharged. They were *denied employment by every company to which they applied for work.* Finally the state stepped in, after a nasty scandal had developed, and although it took two years, the Commonwealth authorities finally had enough influence to secure their reinstatement to former positions. Upon resuming work they were found fully capable of performing their duties and continued to do so.

**Who Will Interpret The Record?**

A RECORD may not be interpreted unless a copy is available for such purpose. The worker having no copy, and none being available for his inspection, the answer to the question is obvious.

**Effect**

WHAT effect would pre-employment physical examination have?

*On the Employee*: As has been noted heretofore, any physical examination, to be of service as an understandable record, must include a complete history of the worker. "The history is as important as the motive in a murder case." A dozen proposed state enactments this year *provide for compulsory autopsies in fatal accident or occupational disease cases.* "Seventy-five per cent of tuberculosis is traced back to pre-employment age — 15 years or younger." Thus we are building up a record against the worker almost from the cradle, certainly to the grave!

*On the Employer*: Regardless of immediate financial gains, by reduction of risks, large employers secure the greatest gains and expend the least sums in securing such benefits from medical examinations. Medium-sized employers gain proportionately less in benefits and proportionately more in cost. A small employer suffers the largest cost and the least in benefit, his needs being of such a character as almost to preclude him from securing suitable workers with 100% physical and historical background, together with craft ability suitable to a small enterprise.

*On the Public*: Considering the worker as a part of the public, fear might well dwell on every doorstep. A childhood disease might mean permanent disbarment from many lines of industry, and the calling or trade of the father, one in which he may be of great service to his boy, will be closed to the youth—a restriction of opportunity, the setting up of grave prohibitions and inhitions, mental and otherwise.

It would be folly to deny that some logical system of pre-employment examination is badly needed in industry, in executive as well as in working departments, and among individuals as well as in groups, but so far our nation has not formulated a workable plan or system for its operation, even if such method is considered from its several angles.

It is true that, backed by civil service, physical examinations, as practiced by the government, have not proved unduly objectionable or burdensome. Private employment, without civil service and for trade union protection, would be a vastly different matter. Even where the strongest of the unions enter the picture much is to be desired.

**Summary**

IN THE foregoing I have attempted in brief to set forth certain facts and to analyze them, together with such comment as seemed to me fitting.

Organized labor objects to pre-employment physical examinations because industry has not qualified itself to ask or even suggest this concession on the part of the worker. To so qualify, it would seem a prerequisite of industry to place itself in not only a safe but also a desirable condition as a work medium for the human element entering into production, transportation, service and other occupations.

Experts tell us that up to 90% of "accidents" can and should be avoided, and that the same applies to occupational disease. Last year 16,000 workers are known to have suffered death because of industrial accidents. Until industry corrects its share of this unjustifiable and needless human wastage, is it qualified to ask labor to further abase itself—and to what purpose should labor do so?

After neglecting its duty to so great an extent, industry now shunts the resultant costs in unequal terms upon the workers, their widows and dependents. As proof I submit the report of the Pennsylvania Commission (Special Bulletin No. 40, Part 1 b, page 24): ". . . . because of *the fixed maximums of the law*, compensation is equivalent to less than a third of earnings." In addition to all of the pain and suffering, the heartaches, the demoralization of family life, following the accident (the great majority of which are preventable or avoidable) the worker must stand more than two-thirds of the dollars and cents cost thereof.

According to the chart exhibited at the San Diego Exposition, and also featured in the traveling exhibit of the Division of Labor Standards, the State of New York, for purposes of comparison, is rated as first in the payment of compensation awards for fatal accidents. Where New York pays on a unit of $1,000 we find that Pennsylvania compensates fatal accident cases on a unit basis of $429, Indiana $476, Illinois $495, etc.

As shown by the quoted extract from the Pennsylvania report, labor is called upon to bear more than two-thirds of the monetary loss resulting from industrial accidents and a much larger proportion of the results from occupational disease.

Labor, being of itself unable to bear that proportion of the cost it finds impossible to take through reduced standards of living, necessarity, if reluctantly, passes the balance on to public or private charity.

Want of time will not permit of an analysis of the Federal-State Security legislation recently enacted by Congress and to be supplemented by state enactments. Without venturing into a discussion of the validity, soundness or practicability of the security program involved or the social, political and economic considerations and implications embraced, it must be evident to all that legislation of this character is bound in one way or another to have a tremendous influence on the subject under consideration. It is perhaps sufficient to indicate when the Federal and several state governments undertake to place definite obligations against industry, employers and employees—to provide for contingencies that are attributed more or less to over-capitalization—over-manning of labor power, mismanagement or maladministration directly or indirectly, that then we have entered an era of regulation wherein private enterprises no longer will be permitted to do as it may please. To those who would avoid such rigid regulation and who would maintain a larger field of private discretion when dealing with the life and well being of another citizen, I can only say that the choice rests with those who direct and administer private enterprises today. Unless a larger social union is manifested in the future than from the past, unless a more equitable interest is manifested not alone in the welfare and well being of employees in immediate and prospective employment, but also in all other groups of citizens dependent for their livelihood on some opportunity of profitable employment of one kind or another—unless private industry meets all of the ever-expanding social as well as economic requirements due to a growing industrial life, then indeed, will there be no course open or procedure possible other than even greater and more rigid state and Federal regulation and control, if not direct public ownership.

In concluding, may I say quite frankly that for the time being wage earners cannot place sole reliance either upon industry or upon government. It is solely to the much abused and much misunderstood trade union movement that the worker can feel some degree of security has been brought into his life. Perhaps in this immediate situation, what labor can best do to meet the growing evils of the present day tendencies of pre-employment physical examination is to be ever alert as to practices being pursued, and by means of public exposure and public discussion either compel industry to meet the challenge of self-correction or of enforced governmental regulation.

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# Employment Examinations

IF THE objections to pre-employment physical examinations on the part of organized labor were ever sound and tangible, they are much less so now—for reasons inherent in the changed relations between employer and employed. The objections, such as they are, have never been very well expressed in public utterances until lately. Matthew Woll's explanation of them (p. 555) is the best we have seen; as spokesman for a cause, as it were, and in the position of advocate for its beliefs, he does remarkably well—so well, indeed, that if the advocacy is less logical than eloquent it is not his fault but rather the fault of the side of the argument on which he finds himself.

When labor was a "commodity," and the employer relied on the common law duties and defenses, the physical condition of the employee at the time of hiring wasn't so important as it has now become by virtue of, principally, the almost unrestricted application of workmen's compensation laws to an intensively mechanized and chemicalized industrial development. There is no question, however, but that it is now a matter of the highest importance. With labor no longer a commodity, but something peculiarly inseparable from the individual—a privilege, a personal perquisite, or even, as the social dreamers would have it, a *right* —then the employer, whether he likes it or not, is forced into the position of being sure, beforehand, that the "right" is confined to its own terms, and is not invoked against his payroll through some manifestation of compensation or other laws when the consideration for the worker's pay is not forthcoming.

Mr. Woll says: "During the same period (1933) more than 16,000 workers lost their lives (and a large, but unknown, number died or were incapacitated because of occupational disease) and a known 300,000 others were permanently or temporarily incapacitated for work because of industrial accidents. Some billions of dollars were wasted because of industrial accidents due to laxness in management. A very great percentage of these mishaps could and should have been prevented or avoided. The major share of these billions of dollars and all of the pain and suffering was borne by labor. Aside from the question of responsibility, and setting aside for the moment the unequal division of monetary charges, it will be conceded that the price paid is a very great one and that correction is imperative."

The phrase "laxness in management" is significant. An example of it is the failure to do, among other things, the very thing Mr. Woll's spokesmanship objects to, viz., *examine* and *select*, to the end of heading off the accident-prone and the predisposed and the otherwise unfit, whose "risk," in the matter of accidents and diseases is greater than it should be. Prevention and avoidance are not possible to management alone; but it must be said for management that it, in general, is trying as hard to prevent and avoid as if they were. Management recognizes even more clearly than labor that "correction" of the mounting cost elements resulting from accidents and diseases is "imperative."

And the employer, in using such scientific aids as the pre-employment physical examination, isn't necessarily going out of his way to work harm to labor or any of its causes. No employer in the country who has a job to be filled or work to be done will raise objection to paying for what is done. His objection is only to the fact that so often while he is paying one worker for doing it, he is also continuing to pay a predecessor in the same work who is no longer able to do it, and whose inability, or disability, was contributed to by the individual worker himself, in any of the innumerable ways in which such contributions are made. The fact that unjustifiable claims for injury and disease are so persistent is itself an indication that the cooperation Mr. Woll speaks about is going to continue to be a one-way street for a long time to come, with the employer expected to traverse the whole length of it.

Possibly Mr. Woll's suggestion that executives should be more carefully examined is pertinent. But "two wrongs don't make a right"—if executives are not "examined" in the full sense it is no reason why nobody else should be. And further, the boss' headache need not suggest to someone under him such things as the "dermatitis artefacta" mentioned by Dr. Levin (p. 538).

Industry is now where it cannot be content with the "average," in any respect. Competition is enforcing more; the buyer—of anything—wants a "preference"; the seller must be prepared to give it. And nothing in economics, or common sense, or social equality can sustain the contention that a man, selling the work of his hand or brain, is so different from his employer, selling tooth paste or Diesel engines, as to make it necessary for the latter to give the preference in what he sells while accepting the average in what he buys—whether material or service. "Present selective methods" are, indeed, open to improvement. And the inevitable direction of the improvement *must* be the further careful study of the individual—physically, and even mentally.

# Industrial Medicine and Surgery

### Trauma as Cause of Cancer

THE plaintiff was injured July 1, when an automobile driven by her husband collided with one of the defendant's wagons. Among other injuries sustained, one of her breasts was bruised and the overlying skin broken. Within seven weeks thereafter a mass developed at the site of the bruise, which was removed surgically, October 23. A pathologist found it to be "early carcinoma or cancer." The plaintiff sued the defendant, alleging that the cancer was caused by the accident. From a judgment for the plaintiff the defendant appealed to the Supreme Court of Wisconsin. While the appeal was pending the plaintiff died, and the action was revived in the name of her administrator.

The defendant contended that the evidence was insufficient to show that the cancer was a result of the injuries sustained in the collision; that it is impossible in a particular case to say with a reasonable degree of certainty that cancer results from a specific injury. In the present case there was sufficient evidence, in the opinion of the court, to establish (a) the fact of injury or trauma; (b) that the injury was sufficiently severe to cause a bruising of the breast; (c) that prior to the injury there was no observable indication of the presence of a tumor; (d) that the tumor or cancer in question developed at the point where the injury was sustained; (e) that the presence of the tumor or cancer was observable within seven weeks from the time of the accident, and (f) that clinical diagnosis and roentgenologic evidence showed that the tumor was malignant. On the question of whether or not, in the face of these essential facts, it can be said with a reasonable degree of certainty that the cancer was caused by the injury sustained, the experts disagreed.

An expert witness, on behalf of the defendant, testified that the cancer did not result from the injury. The pathologist testified that his examination showed early carcinoma or cancer and that the breast also showed the results of chronic mastitis, some cysts and a hard area. He testified that the chronic condition had existed for several months, possibly longer, and that it might have been there for a year; that the cysts might have been there a number of weeks or several months or more. He expressed no opinion as to the cause of the cancer. An expert witness, on behalf of the plaintiff, testified that the injury **might** have caused the cancer, but that physicians "are unable to look at or to examine in any known way any particular malignant growth and say that this did or it did not arise as a result of injury." Another witness stated that, "considering all the facts in hand, and the fact that so far as can be humanly told there was no tumor in her breast prior to the injury, and considering the fact that an acceptable period had elapsed for such a cancer to develop to the size of a walnut, as given, and granting the fact that she had an adequate bruise, to the breast, it is my opinion that it is very probable that this cancer developed as a result of her injury." The testimony of this witness constituted the only evidence in the case, said the court, which tends to remove the question in dispute from the realm of doubt and speculation. The witness, however, assumed that there was an "adequate" bruise. Neither he nor any one else testified as to what an "adequate" bruise is or whether the bruise which the woman received was "adequate." He further assumed that there was no tumor in her breast prior to the injury, an assumption not warranted by the evidence. The evidence, said the Supreme Court[1], when analyzed, establishes no more than a possibility that the cancer resulted from the injury. Therefore the finding of the jury that the injury to the breast did cause the cancer was not sustained by the evidence.

During the trial a medical expert called by the defendant testified that he knew of no authority which stated that a sudden trauma may be followed by the development of a malignant growth. In cross-examining the witness, the plaintiff's counsel read an excerpt from a book on surgical pathology, with which the witness was familiar, to show that a reputable authority had made such a statement. Under the circumstances, said the court, the extract was admissible for the purpose for which it was offered.

In reversing the judgment of the circuit court, the Supreme Court remanded the case for a new trial, expressing the opinion that the facts in the case had not been fully developed.

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### Benzol Poisoning Compensable

FUNK was employed by the defendant company in the production of rubber cement tape, in which benzene (benzol) was used as an ingredient. Eventually he contracted chronic benzene poisoning and was awarded compensation by the Minnesota Industrial Commission. The employer and his insurance carrier brought certiorari to the Supreme Court of Minnesota.

The sole question to be determined, said the Supreme Court[2], is whether or not chronic benzene poisoning is compensable under the Minnesota Workmen's Compensation Act. Section 4327, par. 7, subdivision 9, Mason's Minnesota Statutes, provides that "Poisoning by nitro and amido-derivatives of benzine (dinitro-benzol, anilin and others), or its sequelae" shall be deemed to be an occupational disease and compensable if acquired by any worker employed in "any process involving the use of a nitro or amido-derivative of benzine or its preparations or compounds." It is conceded, said the court, that the word "benzine" was used by the legislature as meaning benzene or benzol, $C_6H_6$, and not $C_nH_{2n+2}$, the ordinary benzine. The effects of poisoning from the fumes of the benzene derivatives are usually acute, while those from benzene are characterized as chronic. Did the legislature intend to distinguish between benzene and its derivatives and include the derivatives and exclude benzene as a cause of occupational disease? It is further conceded that benzene poisoning is a typical occupational disease in the general sense and might well have been included in the coverage of subdivision 9. If the legislature intended to exclude benzene, there was no rational basis for the exclusion. The court thought the statutory language declaring compensable "poisoning by nitro and amido-derivatives of benzine (dinitro-benzol, anilin and others), or its sequelae" should be interpreted liberally in connection with the succeeding language, which provides that the poisoning must have been acquired in a "process involving the use of a nitro or amido-derivative of benzine or **its preparations** or compounds," because the court concluded that the word **"its"** evidently refers to benzene, and that the word **"preparations"** covers mixtures such as caused the workmen's disability in the present case.

The court accordingly affirmed the award in favor of the worker.

1. *Bruins* v. *Brandon Canning Co.* (Wis.) 257 N. W. 35; *J.A.M.A.* (September 7, 1935).
2. *Funk* v. *Minnesota Mining & Mfg. Co.* (Minn.) 256 N. W. 889; *J.A.M.A.* (August 10, 1935).

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### Evaluation of Malingering Tests After Ocular Injuries

COINCIDENT with the increase in legal actions for damages to the person, especially from automobile accidents and contested claims for state compensation of supposedly injured workmen, there has developed a psychopathic element of exaggeration, simulation and malingering, accompanied by downright prevarication to the examiner and perjury in the courts.* It seems now that a monetary recompense for the slightest accident in which another person is involved is sought for in the majority of cases, whether or not an actual lesion has resulted. Either the shock to the nervous system or the cupidity of the individual or both, in these times of monetary depression, tempts him to try to make some money.

A genuinely injured man, having allowed for the physical disabilities of the accident, not infrequently causes it to obsess him, and introspection and subjective sensations are fostered until a psychogenic state is evolved, not resting on the physical injury itself but upon the idea of the injury aggravated by the personal equation of the individual and the personality of those who are associated with him in any claim for damages or compensation that may be under contemplation. Aside from self-produced damage, I believe that some of these people are honest in their complaints, that what at first was a trival pain or loss of function is so mentally dwelt upon that they actually enlarge their feelings and really believe in the condition thereby produced. In other words, "imagination has magnified the malady," and this with financial reasons has led to the claim for monetary recompense.

*HARRY VANDERBILT WURDEMANN, before the Pan-American Congress on board U.S.S. Pennsylvania en route to Venezuela, March, 1934; published in *Northwest Med.*, July, 1935.

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The hysteric sometimes simulates blindness as a flight from reality to excite pity. School children feign pain in the eyes to stay away from school, soldiers and sailors, and especially conscripts, to escape duty.

"The malingerer consciously and voluntarily tries to reproduce symptoms which he either previously had himself or observed in others. In every case it can be shown that there is a conscious, purposive effort to escape unpleasant tasks or situations. It is quite possible that every malingerer is to some extent psychopathic."

Many of these cases are based upon alleged loss of vision. It is fortunate for truth and justice that it is practically impossible for such people to impose upon and delude the skilled eye examiner, for we have many reliable tests which may be easily understood by the judge and jury; thus the medical testimony in such instances should be accepted as final by compensation boards, and in court cases the jury should be so instructed. All cases should be examined with an open mind; many tests should be given before a sentence of malingering is made. A most important part of the examination is the history and the general observation of the patient, not only of his body, and in the subject under special consideration the eyes and vision, but also his mental condition and that of his companions.

The demeanor of the simulator, exaggerator and malinger is characteristic. He complains more of pain and sensitiveness of the organ, does not cooperate with the examiner, gives varying and contradicting answers to questions. The alleged amount of vision is different at several examinations, and does not agree for different distances. He comes in with his chin depressed, usually with the eye bandaged, with friends who desire to be present at the examination, and objects to the necessary handling, especially to the ophthalmoscopic examination. He invariably tries to enlist the influence of the examiner in securing the money he is after; in fact, his talk always hinges on the money he claims he is making. Suggestions of the examiner as to points of pain and symptoms, no matter how impossible, are usually agreed to and magnified.

Persons actually blind short step, turn the face upward, acquire a staring, meaningless expression, and have a listening look, apparent to anyone who has had experience with the blind. The blind man will extend his arm for a handshake and sit down in a chair when directed, while the malingerer will fumble and have to be urged to sit; and if the seat is suddenly moved, will not obey.

Given a case in which inspection and examination by our various instruments of precision elucidate one or both eyes to be normal, or with little evidence of previous possible injury in the form of cicatrices or opacities of the media, eliminating or allowing for those cases in which congential defects or errors of refraction are found, after the history is obtained and a general psychic examination is made, we may proceed to the various malingering tests which it is the purpose of this paper to evaluate from the author's experience. It may be that this discussion will develop others not here considered.

The alleged visual acuity by the Snellen Standard of letters and their modification will vary more than in a normal person at several examinations, and especially at different distances and with the illumination. A modification of this is Roche's test of 100 cardboard squares with single letters each, 10 for each line. The examiner places the letters named and those missed in two piles. The examinee, having no means of comparison, finds it difficult to deceive the examiner. This may be modified by using the letters reflected in a mirror, a useful test which may be shown the patient in proof that he is lying.

Schmidt-Rimpler's test for bilateral amaurosis is for the patient to look at his own hand, modified by Burgardt to put out the forefinger of one hand and touch it with the other. Actually blind persons will direct their eyes to their own hands and touch fingers, whereas the malingerer will look purposely elsewhere and will not touch fingers.

Kopiopia, or loss of accommodation, is almost always due to errors of refraction, paresis of the ciliary muscle, heterophoria, neurasthenia or hysteria, but this tiring of vision is a common complaint. It can only be determined by detective work, when it may be found that the malingerer is spending much time in reading, etc., while he is not observed. I have had several cases in which the complainant's principal allegation was that before the accident he wore no glasses and had to wear glasses afterwards, noted especially in people around 45 years of age.

The art of simulation of visual field defects is not known to the laity, yet there have been such cases reported. Personally, I have not demonstrated such to my satisfaction, as the concentric contraction or irregular fields found have occurred in demonstrable hysterics. If such be complained of or found by an examination, charts should be made on several days and compared.

Diplopia is not rare after accidents, but true double vision should be readily demonstrated by the stereoscope and by the usual muscle balance tests. Bilateral amblyopia and amaurosis are seldom feigned, yet are known. An allegation of blindness occurring with no objective signs is certainly a ground for suspicion. Here we must carefully eliminate those rare but true cases of blindness, in which the optic nerve shows no atrophy and pupillary reactions are normal, which are due to lesions high up in the optic tract.

Dilation of the pupils is almost a constant of amaurosis but factitious mydriasis may be produced by cycloplegics which, however, produce full mydriasis, whereas the pupil in actual nerve blindness is partially dilated as in the cadaveric state. The test lenses are useful, as the malingerer will often allege that a weak lens or even a plain glass improves or diminishes his vision or causes pain.

Harlan's method of making one eye myopic with a 6 D. lens and having the patient read at normal distance, at 10 cm. and then in the distance demonstrates that the alleged blind eye sees. Jackson places a +4.00 lens before the blind eye and a +2.00 before the sound eye. The distance point of the one will be 25 cm. and the other 50 cm. If he selects 25 cm. and reads, the blind eye sees.

Von Graefe's method of causing double vision in the better eye by a prism, or preferably a double prism, is accompanied by having the patient read aloud first one and then another of the double images. With a single prism the claimant will not always acknowledge double vision.

The crossed diplopia test with a 10° prism base out will necessarily cause the eyes to converge involuntarily to avoid the double vision thereby produced.

The stereoscope, or Vieusse's method, demonstrates that the alleged blind eye sees, if the examiner is careful not to let the claimant see the charts before they are placed in position, and assures that both eyes are open.

Above all for quick determination is the method of Snellen of alternate red and green letters looked at with red and green lenses. The one eye sees **f i n** and the other **r e d**, whereas with both eyes the word is **friend**, but educated malingerers are "on" to this test which is easily remembered. The first examination, however, usually catches the complainant in his prevarication.

Not yet in the textbooks is the use of the Howard-Dolman depth perception test, the rods in a box at 6 m., which is impossible of accomplishment by monocular vision.

A new malingering test for the near is that of Ransom-Pickard which I describe more in detail and here demonstrate. This is a test for (1) color perception, (2) stereoscopic vision, (3) near depth perception for both binocular and monocular vision, (4) neurasthenia and staleness, and (5) malingering. It is a valuable adjunct in the examination of applicants for aviation license, especially in those cases in which there is an inequality of visual acuity with heterophoria. It consists of a cork dinner mat eight to 10 inches in diameter covered with black velvet. On this are stuck 30 to 50 pins having different colored heads, varying in length from two and one-half to one-half inch. Those actually used by me are 50 in number, 10 each of black, white, red, green and blue, the colors being distributed over the different length of pins.

The examiner first demonstrates the test but does not explain for what it is designed. He holds the disk or places it on a stand horizontally, two feet in front of the examinee who is given a full length pencil. Holding this in one hand one foot above the disc, he is told to touch all the pins of a certain color, for instance, red, with the blunt end of the pencil, keeping his head still. This is repeated with each of the five colors; the number he hits for each color is noted and finally added together. Using 50 pins, a percentage is obtained. Glancing strokes are counted misses. The pins must be

1. Clinical Neurology, Wechsler, 1931.

hit squarely by the blunt end of the pencil.

This is, next to the Holmgren red and green letters, the most important test for monocular vision, particularly in malingerers who claim to be blind or see poorly in one eye. For if they score 90 to 100% of hits, they surely see with both eyes and their lying claims are thus unsubstantiated.

Scores of 100% of touches are usually obtained with both eyes open with stereoscopic vision in normal persons, but with one eye occluded or a one-eyed man or one with ocular muscle defects, as heterophoria, squint and heterotropia, there will be a large percentage of misses. The neurotic and those who are tense, or aviators who have gone stale, will hesitate and show a certain degree of tremor. Defective depth perception findings, as shown by the Howard-Dolman rod test at six meters, are corroborated.

In approximately one year after the loss of vision in one eye, as is also the case with congenital or long-time monocular seeing persons, a certain degree of depth perception is acquired. This may be sufficient so that they are not much handicapped in work requiring the use of tools. It has further been found by examination of a considerable number of such persons that they are able to score 50 to 75 hits by this test. This may be taken as normal for the monoculars but in a normal seeing person with one eye occluded or one recently blinded in one eye, few of the pinheads are touched. This may also be the answer to the question of safety for one-eyed automobile drivers and perhaps to those exceptional airplane pilots with one eye who have flown many miles without crashes.

Practically all of these tests may be described in plain language and demonstrated to a jury of laymen, so that there will be no doubt in their minds of the reliability of the opinion of the examiner and they may see for themselves that the complainant is feigning blindness or diminished vision.

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## Poor Health an Accident Risk?

I WAS asked to talk on the advantage of pre-employment examinations to employer and workman, but have broadened the subject somewhat.* There is no doubt in my mind of the soundness of such examinations in principle and theory. No doubt that such examination eliminates applicants who represent added accident risk to themselves, and many more who would carry added risk from occupational disease as well as accident.

There is not a bit of doubt but that defective vision, color blindness, slow nerve reaction, in a driver of whatever sort, mean a smash sooner or later. No question that the flat-foot will presently cripple down on a milk-man's job or at lifting. No question, worse luck, that the aging cardio-renal is likely to get into trouble under strain, is sure to be a tardy convalescent from whatever happens to him.

### The Employee's Side

ALL THIS from the side of the employer or carrier. What of the employee? He, not unnaturally, opposes any examination that may cut him out of a job. And there is a bit to be said for his point of view,—at least until we get things better organized, so as to adjust jobs to the substandard worker. Yet, even as things lie, it is no kindness to let a man into a job which is going to break him. The chance of compensation after a breakdown is small solace to a man who wants to work.

Properly handled pre-employment examination means only that the worker will not be accepted for a job at which he will presently—through no one's fault—break down beyond repair, or run serious risk of accidental injury. If his defect is remediable he can be patched—and back to the full job. If not, he can be fitted into a job he can do,—if need be with preliminary training to bridge any gap between the old and new occupations.

It has been my ever-increasing conviction that the high grade working man has about as good a working head as the average professional man. Sometimes I think he has more sense, at least. And just because he is a bit damaged in one or the other corner doesn't mean that he should be out. He can learn, use his head more, his legs less, be a better man than he was. What he needs is help in training and adjusting himself, help in placement in the job he can do. And for this our machinery is lacking as yet.

And here we come to the exact parallel between the originally substandard workers and those who are sub-standard because of injury. The injured man, temporarily sub-standard, may still have more recovery chance, but the difference is not large, the problem the same. The man who has been hurt is a definitely increased accident risk at his old job until he has gone through a refitting period.

### The Present Problem

AND this is our present problem—one of refitting man to job, job to man. Actual experience so far is with the convalescent injured man. I have been interested in this problem for years and have been concerned actively with the surgical reconstruction of injured men and getting them back to work, on the old job by choice. This problem has been the surgical one primarily, but one regularly runs into the stage where surgical care is accomplished, but with the convalescent not yet fit to work. And not only in the surgical cases but in the field of industrial disease, we have made progress. Let me cite the brilliant progress in handling industrial skin disease, lead poisoning, benzol poisoning. And in all these fields continuous convalescent care, supervision and adaptation of the man and the job are just as essential as with the surgical cases.

Our worst wastage now is in the handling of a man who should go back to his old job but never does because of the long temporary disability that often follows surgical recovery, the period when he is pretty good, but not quite good enough, or later when he is really fit but has not the nerve (and no blame to him) to tackle unaided a heavy job or one involving risk. Little has been accomplished as yet in convalescent care or in adapting the still slightly damaged worker to his job—and his job to him.

### Restoration of Damaged

MUCH needs to be done and, for one thing, some measure of occupational therapy of a practical sort needs doing. Fitting in of the worker temporarily below standard is hard to contrive save in case of great industrial units like the steel works, for it means often a continuation of surgical care longer than usual, a physiotherapy not of the usual routine type, but definitely contrived to bring about full recovery in the case in hand, and then some bridging of that dread interval between recovery and the job. In some parts of the country certain large industries have organized this work, three or four in this state have done well with it, but in the main the work here is in the hands of insurance carriers, the medical and surgical care mainly and properly in the hands of medical practitioners.

No one has really been in a position to coordinate convalescent care, reeducation or fresh vocational training and placement. I realize the difficulties in this. Whether it can best be done by coordination of effort on the part of the carriers—or whether it will need state and organization, I do not know. But I do know that it can and must be done.

We must restore the damaged or substandard worker who has working value to the earning body of men as a whole man, or help him fit himself into our social and economic life so that he can be a man even if not 100% whole.

### Is It Utopian?

THIS scheming is Utopian, you may say—not to be worked out in these days of unemployment in a state where industry is already so heavily burdened in paying compensation. So far as the injured worker is concerned, at least, I do not think so. With proper planning it should not mean added expense; certainly not to the community, probably not even to industry. As things stand the employer is paying 500 weeks of disability if the injured does not go back to work. Long ago the more intelligent "carriers" learned that expert surgical and medical work better than paid for itself, at least in all but minor injuries. Examination and experiment will show that more and more intelligent convalescent care will more than pay for itself in the same way in shortening the compensation period.

Suppose there were a clinic to take over convalescents, give them the needed real physiotherapy, not just "B & M", baking and massage, usually useless, but real purposive physiotherapy, largely consisting of active exercise. Suppose this combined with occupational therapy, not "boon-doggling", but the sort of thing that teaches a man to use his hands again.

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*DR. FREDERIC J. COTTON, Address at the General Industrial Session of the Massachusetts Safety Council Conference; published in *Industry*, August 10, 1935.

It should be under supervision of a surgeon experienced and interested in recovery problems, and conversant with what physiotherapy and occupational therapy can do. He should, of course, have access to medical consultants. The supervisory officers should be of the highest grade. Under any others such a clinic would go into routine and dry rot. Obviously there would be an initial outlay, but I am very sure the thing would pay for itself, very soon and with a substantial margin.

The idea is not new. Something like this was planned by Dr. E. G. Brackett and myself 14 years ago with the support of Mr. Magnus Alexander and the Associated Industries. This was shaping up nicely when the panic of 1921 scattered my interested industrialist far and wide.

But it can be, should be done. With such provision for the return of the injured to work, the problem of the sub-standard fellow found below par on pre - employment examination would be simplified. It would very evidently be the role of the community, not industry as such, to take care of him, and very evidently to the interest of the community to enable him to work rather than be supported as a loafer.

And this is going to be a real problem, because whether we like it or not, the risk of accident from existing impairment is going to force preemployment examinations. Above this risk there can be no doubt at all and the conclusion is obvious.

Perhaps the suggestions here given are worth acting on. Perhaps the fellows who pay will see this, and act. If so they can be sure of interested and somewhat intelligent help from some medical men, long interested in these matters of human repair and the return of the man to the job.

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## Occupational Poisons and Diseases, 1932-1933

JAMES D. HACKETT, Director, Division of Industrial Hygiene, New York State Department of Labor, in **The Industrial Bulletin:** The figures on occupational poisons and diseases for 1933 show a decided increase over 1932, principally because of an amplification of the occupational disease schedule which began to show results in 1933 and also because of the fact that there were over 100 cases more than the ordinary from poison ivy among emergency workers on roads and parks.

The figures for 1933 have been arranged according to a new plan and those for 1932 have been rearranged accordingly. Whenever possible occupational diseases have been classified by cause rather than by result. The foundation for the classification is a standard terminology by which all causes have been classified and, for instance, cases due to caustic soda, lye, hydroxide of soda, are all found under the selected heading, "sodium hydroxide."

The statistics composing the table are, unfortunately, of two classes; those from upstate are merely cases reported, while those in New York City are closed cases. The reason for this is that the Division of Industrial Hygiene has no representative in the upstate offices to secure the necessary information.

The extension of the Workmen's Compensation Act to include dermatitis due to acids, alkalies and oils has resulted in a large increase of cases, so that those due to occupational dermatitis now predominate. As an evidence of this the cases due to dermatitis alone for 1932 were 369 and for 1933, 565, an increase of 53%.

For these reasons, comparison of the two years does not indicate the true situation. An increase of cases is often due to a growing consciousness of the dangers. Thus there is a considerable increase in the number of carbon monoxide cases and also in that of chrome, doubtless due to the fact that owing to the more widespread education workers are recognizing disabilities that have hitherto passed unnoticed.

Lead continued to be one of the serious occupational poisons but the improvement has been slight and that chiefly in the lead battery industry.

In almost every situation where dermatitis is a factor large increases may be seen, with the single and phenomenal exception of dermatitis resulting from the use of cement. The cause of this is doubtless a decrease in exposure owing to the depressed state of the construction industry.

Friction causing blisters is increasing in numbers owing to the fact that workers are becoming conscious for the first time that this is a compensable disease but, as a matter of fact, few workers get compensation because the disability is not likely to be prolonged.

Owing to the fact that claims are sometimes made for compensation without sufficient grounds and that the supposed cause was not the actual cause, the figures here have to be accepted with a certain amount of reserve, but they represent the general situation. For the first time in making these records an effort has been made to separate the non-schedule cases of dermatitis from the rest and to classify them into occupational and non - occupational causes. This indicates that a considerable number of applications are made for compensation where the cause could not by any stretch of imagination result from the work.

### OCCUPATIONAL POISONS AND DISEASES

| Cause | Year 1932 | 1933 |
|---|---|---|
| Acetic acid | 1 | 1 |
| Acetylene | ..... | 2 |
| Acid, unsp. | 3 | 3 |
| Alcohol | 2 | ..... |
| Alkali, unsp. | 10 | 8 |
| Amido benz | 32 | 33 |
| Ammonia | 6 | 8 |
| Aniline dye | 10 | 7 |
| Animal dust | 3 | ..... |
| Anthrax | 4 | 1 |
| Arsenic | 7 | 8 |
| Benzine | ..... | 9 |
| Benzol | 1 | 1 |
| Caisson disease | 1 | ..... |
| Calcium chlor. | ..... | 3 |
| Calcium cyan. | ..... | ..... |
| Calcium hydrox. | 4 | 15 |
| Calcium phosph. | 1 | ..... |
| Carbon bisulph. | ..... | 1 |
| Carbon monox. | 17 | 30 |
| Carbon tetrach. | ..... | 4 |
| Cement | 29 | 16 |
| Chem., unsp. | 14 | 3 |
| Chlorine | 4 | 5 |
| Chrome | 11 | 22 |
| Citric acid | ..... | 3 |
| Compressed air | ..... | ..... |
| Copper | 1 | ..... |
| Creosote | 1 | 1 |
| Cresol | ..... | 1 |
| Cyanide, unsp. | 2 | 4 |
| Derm. non-schedule | 54 | ..... |
| non-occupational | ..... | 40 |
| occupational | ..... | 50 |
| unknown | ..... | 1 |
| Dinitrobenz. | ..... | 1 |
| Disease non-schedule (other than derm.) | 21 | 28 |
| Dust, unsp. | 1 | ..... |
| Dye, cloth | ..... | 11 |
| Dye, fur | 33 | 22 |
| Dye, leather | ..... | 2 |
| Dye, silk | ..... | 2 |
| Dye, unsp. | 15 | 7 |
| Formaldehyde | 5 | 8 |
| Friction | 8 | 30 |
| Fur | 2 | ..... |
| Gas | ..... | 2 |
| Gasoline | 6 | 8 |
| Halowax | 1 | 9 |
| Hydrochloric acid | 2 | 9 |
| Hydrofluoric acid | 1 | ..... |
| Hydrogen sulf. | 1 | 10 |
| Hydroxy benzene | ..... | 1 |
| Ink | ..... | 1 |
| Kerosene | ..... | 7 |
| Lacquer | 9 | 9 |
| Lead | 17 | 16 |
| Lead arsenate | 3 | 3 |
| Lead battery | 18 | 15 |
| Lead carbonate | 2 | 1 |
| Lead colors | 11 | 2 |
| Lead oxide | 6 | 11 |
| Lead paint | 31 | 33 |
| Lead paint dust | ..... | 1 |
| Mercury | 3 | 1 |
| Methane | ..... | 2 |
| Methyl alcohol | ..... | 4 |
| Methyl para am. ph. | 3 | 2 |
| Methyl chl. | ..... | 1 |
| Nickel | 1 | ..... |
| Nicotine | ..... | 2 |
| Nigrosine | 1 | ..... |
| Nitric acid | 1 | 2 |
| Nitro cellulose solv. | 2 | 1 |
| Oil, unsp. | 10 | 5 |
| Oil machine | 6 | 8 |
| Oil, mineral | 3 | 2 |
| Oil, vegetable | ..... | 8 |
| Oxalic acid | 1 | 4 |
| Paint | 1 | ..... |
| Paraffin | 1 | ..... |
| Paranitranitin | 2 | ..... |
| Paraphenyl diamine | 3 | 1 |
| Petroleum naphtha | 1 | ..... |
| Petroleum prod. | 3 | ..... |
| Phenol prod. | 6 | 9 |
| Phosphorus | ..... | 1 |
| Phenyl hydraz. | 1 | ..... |
| Pitch | ..... | 1 |
| Plants | 2 | ..... |
| Poison ivy | 30 | 131 |
| Pot. cyanide | 4 | 2 |
| Pot. hydrox | 1 | ..... |
| Pressure | ..... | 3 |
| Rubber cement | 2 | 2 |
| Silica | 6 | 5 |
| Soap | 8 | 27 |
| Soap powder | 28 | 39 |
| Sod. carb. | 9 | 11 |
| Sodium chlor. | 2 | ..... |
| Sodium fluoride | 1 | ..... |
| Sodium hydrox. | 6 | 13 |
| Sulphuric acid | ..... | 6 |

| | | |
|---|---|---|
| Sulfur diox. | 6 | 3 |
| Synovitis | 1 | ..... |
| Tartaric acid | 1 | ..... |
| Tetra ethyl lead | 2 | ..... |
| Thinner | ..... | 2 |
| Trauma | 6 | 9 |
| Trichlorethylene | 1 | 1 |
| Trisod. phosph. | 7 | 5 |
| Turpentine | 12 | 7 |
| Unknown | ..... | 2 |
| Varnoline | 1 | ..... |
| Vegetable | 8 | ..... |
| Water | 3 | ..... |
| Zinc chloride | ..... | 1 |
| Zinc sulfide | 3 | ..... |
| Total | 610 | 866 |

## Dusty Death

THERE is a sinister ghost that stalks every industry — a ghost whose name itself is forbidding. It is called "pneumoconiosis" and it is quite as dangerous as it sounds; dangerous in more ways than one.*

Pneumoconiosis is the general scientific term applied to describe all types of dusted lungs. Its literal translation is "a dusted lung". As a generic or family appellation it embraces the diseases which may result from inhalation of any sort of microscopic particles, common or rare.

In industrial practice, of course, there are four principal sub-divisions of pneumoconiosis which occur with sufficient frequency to make them the subjects of this short general symposium. The first of these types, and perhaps the most commonly encountered is silicosis.

What is silicosis? It is a disease of the lungs in the progress of which there is a gradual replacement of the normal elastic by unyielding inelastic fibrous tissue. Its cause is the intermittent or continuous breathing of microscopic particles of silica dust or sand for varying intervals of time. This causes an increase in the volume of fibrous tissue in the lungs which, in turn, is marked by shortness of breath and decrease in lung expansion with a resultant susceptibility to tuberculosis.

Asbestosis is caused, as the name implies, by the inhalation of microscopic particles of asbestos dust. This type of pneumoconiosis produces a definite and general fibrosis of the lungs. That is to say, a large volume of fibrous tissue is developed in the lungs as the result of the chronic inflammatory condition induced by the presence of asbestos dust. The problem of treatment becames involved because, instead of normal tissue which is diseased, it is necessary to deal with tissue chronically inflamed by this unusual causation. Fibrosis of the lungs set up by asbestos dust inhalation is as serious to the point of disability as silicosis but, so far as our present clinical experience goes, not nearly so frequent in occurrence.

Cementosis is a vague term which I have been unable to discover in the literature of pneumoconiosis though it has considerable current lay usage. I am of the opinion that it originated in the minds of imaginative lawyers to enable them to bring action against a great industrial organization (Case 1). The physician employed by the attorney gave, as his diagnosis, a statement to the effect that the man's condition was due to inhalation of cement dust during a period of seven years.

Anthracosis, as seen from its composition, is the designation which classifies pneumoconiosis contracted from breathing coal dust or microscopic particles of carbon. These particles are present, of course, in the atmosphere of any populous center where coal consumption is heavy. Men who work in or about mines and coal yards are the logical victims of its attack.

In general, however, it is preferable to use the generic term pneumociosis to label any form of dusted lungs. Perhaps it is well to emphasize the fact that silicosis can be contracted only by breathing microscopic particles of sand or silica dust. Clinically and medicolegally, silicosis has no distinct cause or effect relationships with the other forms of pneumoconiosis.

Silicosis makes its appearance among workers in industries whose atmosphere contains microscopic particles of silica. The word microscopic must be repeated frequently in this text because it most aptly defines these extremely minute insoluble bits. It is common practice to consider as harmful only those particles which have diameters smaller than 10 mm. Since a micromillimeter is equivalent to 1/25,000 of an inch, it will be seen they are so small that they must be counted or studied under the microscope.

A great deal of interesting and effective work has been done in industry to protect those employes who devote their entire time to sharpening tools on grinding stones. It was thought, at one time, that water poured continuously over the stones would eliminate the free silica particles which result from such operations. Tests have proved on the contrary, that the application of water actually heightens the hazards because the particles in suspense in the liquid are thrown to distances greater than those attained by the ordinary resultant dust.

Probably the sand-blaster is the worker who undergoes the greatest risk in following his occupation. We have known for a long time that men so engaged must have protection against flying dust and scale. More recently we have realized that the microscopic particles set free by sand-blasting activities are really more dangerous and call for more studied defenses than the visible.

The dusts occasioned by grinding and sand-blasting operations may be divided into two general classes, soluble and insoluble. It is needless to elaborate the divisions excepting to say that soluable dusts are relatively innocuous. Insoluable dusts, unfortunately, are always present and always dangerous because they usually occur in highly concentrated proportions—a fact, previously mentioned, quite as evident when wet process grinding wheels are employed.

It may be interesting to industrialists to know what actually happens to inspired dust. Remember, now, that we are concerned with these micromillimetric particles discovered only under the microscope. This dust is inhaled through the nostrils and mouth into the trachea. Thence it passed into the bronchi and from there into the air cells and the medisteinal glands.

These glands are designed by nature

* R. ROBINSON DUFF, in *Central Manufacturing District Magazine*, February, 1935.


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THE object of this Association shall be to foster the study and discussion of the problems peculiar to the practice of industrial medicine and surgery; to develop methods adapted to the conservation of health among workers in the industries; to promote a more general understanding of the purposes and results of the medical care of employees, and to unite into one organization members of the medical profession specializing in industrial medicine and surgery for the mutual advancement in the practice of their profession.

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to attempt the protection of the lungs against infection as well as foreign bodies. Thus the body not only has means to prevent a limited amount of dust from reaching the lungs but also to expel some insoluable particles which may penetrate to them. When this limited capacity has been exceeded, however, the lungs gradually become clogged. The literature tells us that this clogged condition is progressive and cannot be cured by prevention of further exposure to dust.

A meeting of the Chicago Tuberculosis Institute in the summer of 1932, held in the Chicago Woman's Club, and attended by men interested in the future welfare of industry, listened to a symposium of silicosis rendered by the leading authorities in America. To illustrate the insidious nature of this dusty death that, ghostlike, stalks industrial ranks, it is true that the net result of an entire evening spent in learned discussion left the question in all minds whether or not a definite and positive diagnosis could be made before the subject was on the autopsy table. Two things which live vividly in my mind really constituted the bone of contention in the discussion.

First, the x-ray must be able to demonstrate a definite fibrosis of the lungs, i. e., an excessive amount of fibrous tissue which, as stated, would result in shortness of breath and lack of expansion with their concomitant predisposition toward tuberculosis and death.

Second, in the opinion of these authorities, all determinate cases of silicosis have resulted in terminal tuberculosis which eventually caused death.

Perhaps this subject may be made to shed some of its technical prosaicalness and assume a more pertinent and lively interest if I interpolate brief histories of three cases of pneumoconiosis which have come under my observation in the Central Manufacturing District within the past 18 months. Please do not misunderstand me. There may be many others which will be heard from in the future. These three I shall mention have ripened into just the sort of cases with which industry increasingly is vexed. They are now in the courts.

Case No. 1: Company "X": Mr. John Doe:

I received a request by telephone to call on the patient at once. Upon arrival I found him confined to his bed with a temperature of 103.5°. The history obtained described a slight chill and pains in chest and abdomen. It was in late autumn. He had many rales, that is adventitious sounds, in his chest which indicated influenza. Upon tapping his chest and stethoscopic examination there was found nothing that would indicate pneumonia but plenty of evidence typical of influenza infection.

The important point from the standpoint of the industry concerned was that of accident. Was the patient's condition produced or aggravated by an accident of any kind, however, trivial? To the questions put in this direction the answers were negative. I instructed the family to place the man under the care of the family physician.

Seven months later I was informed that suit had been instituted against the industry for $50,000, under the claim that the patient was a victim of cementosis. A portable x-ray machine was taken to the home and efforts made to obtain pictures in bed. The man's condition grew progressively worse.

He was removed to the hospital where consultation was requested and had immediately. Futher x-ray photographs were taken and discovered a large abcess in the apex of the upper portion of the right lung. The patient died about two weeks later. The consultant physician, a leading Chicago practitioner, was unable to affirm that cementosis was in any way a causative factor in death.

From the history and course taken by the illness, it was the typical end result of a very extensive and severe influenza infection, and developed no symptoms which would substantiate the claim of cementosis. (Note: The case has never come to trial. We have induced the attorney for the plaintiff to scale down the claim from $50,000 to $2,500, and I am under the impression that the circumstances will keep him concerned for a long time.)

Case No. 2: Industry "Y": John Doe 2:

This man, aged 42 years, worked in the industry for about nine months. His record as an employee was unsatisfactory and he was discharged. Four months later an attorney served writs upon the industry to inform it of the institution of a suit for $50,000. Anthracosis was claimed as grounds for damages. The case is pending still.

Case No. 3: Industry "Z": John Doe 3:

It was this man's task to grind tools on a revolving stone. He was furnished an inhalator and instructed to wear it whenever the stone was in use. Obstinately indifferent, the worker became disgruntled over the foreman's insistence that the inhalator must be worn and finally refused point blank, went to the office for his pay,

and disappeared. Five months later suit was filed in his behalf for $50,000 under the claim of contracted silicosis.

I quote now from a Hibbing, Minnesota, dispatch published in the Chicago Daily News on November 30:

" A verdict of $22,500 was returned by a District court jury in favor of James Golden, of Keewatin, who sued Lerch Brothers, Inc., of Hibbing, as a result of a rare disease alleged to have been contracted while in their employ as a chemist. The disease, pneumoconiosis, provoked considerable discussion among an array of medical experts who testified for both sides."

As well it might. Of the merits of the Hibbing case I cannot speak. It just happens to offer a timely example of a threat to industrial coffers which, authorities recently have estimated, now aggregates $300,000,000 in the United States. I have been told that a certain Illinois corporation would be reduced to dissolution were it to be required to pay the pneumoconiosis damages now claimed in pending suits against it.

I am informed on excellent authority there is an organization of lawyers and doctors of questionable reputation engaged in the exploitation of dusty death. The modus operandi is simple enough. Advertisements are broadcast which ask grinders to appear at the organization's employment office for jobs.

Upon their appearance, lawyers obtain from the applicants very careful histories of past employments, conditions therein, and durations of such employments. The medical department of the clique then gives each applicant a scrupulous physical examination with especial attention focussed upon the lungs. In cases which seem to promise well for their nefarious ends, even extensive and careful x-ray photos are made of chests and lungs.

From these applicants the organization selects the men it considers best adapted to its purposes and deliberately places them in industries calculated to assist their aims logically. After a given time, when circumstances appear propitious, the men are taken out of industry and into the courts, and presently the affected concerns find themselves the defendants in $50.000 (limit) suits for damages charged to silicosis contracted in their employ.

This article is not intended to sound the loud alarum. The National Safety Council and other agencies for a long time have emphasized the lurking risks of pneumoconiosis and advocated the adoption of advanced measures of prevention. In particular Dr. C. O. Sappington, formerly director, Division of Industrial Health, National Safety Council, and now Industrial Hygiene Consultant, has contributed notably to the literature and research of the subject. The sinister aspect of dusty death exploited at the hands of unscrupulous and unethical persons, however, has not been published sufficiently to apprise industry of its possible liabilities.

There are, of course, the simple measures which industry should practice in any event in its own interests. Knowing your employees is, perhaps, the first essential to prevent involvements. Physical examinations at the time of employment and at regular intervals thereafter will avoid many exploitations. Keep abreast of the scientific advances with respect to control and treatment of pneumoconiosis, and rigorously insist that workers shall observe occupational precautions prescribed. There are devices, constantly improved, which are essential. The few dollars thus invested are spent well. Otherwise there are the practices of plant sanitation which should be a matter of practical pride as well as prevention, and should be observed diligently.

The fact that, as seen in the meeting I described and the Hibbing dispatch quoted, medical talent itself is divided in the adjudication of pneumoconiosis cases speaks volumes for caution, if the figures given are not

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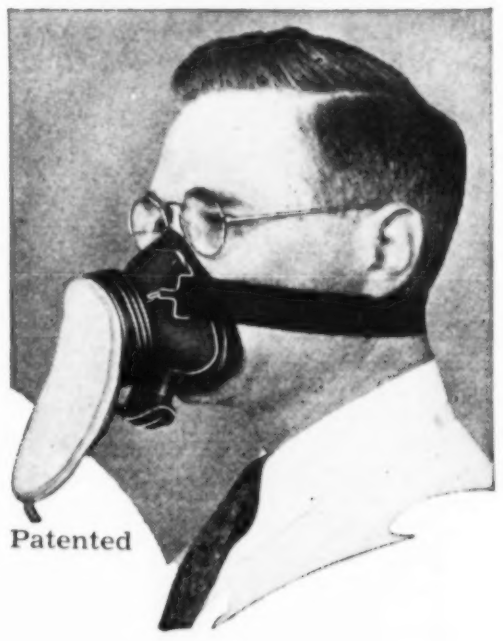

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"IT SHALL be the duty of the Division to investigate conditions of occupation with reference to hazards to health and to determine the degree of such hazards, to investigate and evaluate methods for the control of such hazards to assist in the preparation of rules and regulations for the preventing of occupational accidents and diseases, and, in cooperation with the department of public health or otherwise, to promote occupational health and safety education."—Sec. 11A of the law creating the Division, effective 1934.

sufficiently impressive. So far as the humanities are concerned, industry is interested in the disease along with all other social groups. But its material significance is quite as formidable, especially since there are those who would victimize industry for profit.

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### Organized Labor and Railway Medicine

RAILWAYS undoubtedly offer the safest means of travel that we have.* The public has been impressed with the elaborate means of protection, mechanical and engineering safeguards, that have been provided. At considerable expense, equipment is frequently inspected—the locomotives, cars, air brakes, signals, switches, rails.

But do the railways take similar precautions with the employees who operate the trains? A questionnaire taken a few years ago revealed that none of the 13 railways comprising the southeastern district required a periodic examination of their train service employees. Here is a link in the safety chain as important as the mechanical. Certainly the engineer's acuity of vision is as essential as the signal system, while failure of his heart can be as disastrous as a failure of the air-brakes. Why, then, is the human element disregarded in so far as health examinations are concerned? The railway medical staffs are already established and the additional cost would be meagre. But because of the attitude of organized labor this issue has not been forced, to the detriment of all parties concerned: the railway, by damage to equipment and liability claims should wrecks occur; the traveling public by endangering its safety; the employee by denying him the benefits of periodic health examinations.

Because of the political influence of a large labor group, little can be expected of any governmental regulating commission toward effecting such requirement, even though stringent rules may necessitate the provision and inspection of all sorts of mechanical safeguards.

In that way then can we keep these employees under medical observation and how can the situation be improved? First, by the careful selection of candidates for employment. In accepting applicants the examiner should look ahead 20 years. The man with the well compensated heart murmur, with the moderate rise in blood pressure, or with the history of arthritic symptoms may be well along the road toward disability within 15 or 20 years. Why take on today those who will cause us grief tomorrow?

Secondly, check-up examinations are made under the rules for various reasons: if an employee has been out of service for six months; following recovery from a severe illness or injury; for promotion; for pension; and if, in the opinion of a superior officer, examination is advisable when some physical defect is apparent or the employee fails to observe signals or perform his work properly. Defective employees once found should be kept under observation.

*V. A. Lockwood, M.D., addressing the Sixteenth Annual Meeting of the Florida Railway Surgeons' Assn., Ocala, May 13, 1935; *J. Florida M.A.*, August, 1935.

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Finally, the Hospital Association with its staff of local surgeons perform a most important function in detecting and treating the physical ailments of employees. Upon this organization falls the tremendous responsibility of seeing that the men who run the trains are mentally and physically capable, and that catastrophe will not occur through the sudden failure of the human machine.

Sometimes I like to compare our medical offices with automobile service stations. These latter give what they call service plus. When the motorist drives in for gas they check the oil, the water, the tires and even the brakes and motor if time is afforded. The motorist leaves with a sense of security, a valuable machine is protected, and accidents are less liable to happen. Perhaps the station attendant hasn't had in mind the extent of the scope of his work, but he does make additional sales. Why can't the doctor render the same service plus? I am sure that many of us do. When a man comes for a trivial ailment why not observe him carefully? Is his hearing acute? Has he had his blood pressure taken recently? If we apply this rule to our train service employees the man will frequently be benefited by the detection of some serious disease and helped by early treatment. The railway and the traveling public will likewise be protected, while the doctor himself increases his practice.

This program cannot be successfully carried out unless the confidence of the labor organizations is gained; by always dealing squarely with their members; and by manifesting a helpful interest in their physical condition. We should not strive to seek out those men who are not perfect specimens of manhood and discharge them from employment. Rather do we desire to detect disease in its earliest stage and to keep them on the job as long as possible by assisting in the maintenance of health. Never should a long record of service be forgotten, and I have found that almost invariably a man can be placed in a less dangerous position if he is at all able to work. An engineer seems willing to give up a crack passenger run and to work on a branch line or a switch engine or to hostle if he knows that through some serious physical defect he endangers the lives of those whose safety is entrusted to his care.

It has been my experience that railways wish to maintain their old, trusted and valued employees in service as long as possible, and will bend their efforts in this direction as far as compatible with safety. That policy would be short-sighted which eliminated the older employees unless a suitable pension be provided, and its effect upon the loyalty of the remaining employees would be disastrous.

The labor unions have always feared that examinations by medical departments of railways might be used as a subterfuge to eliminate undesirable employees. This is unfounded in my experience.

We find more and more men reporting voluntarily for health examinations, coming now in confidence with nothing ailing them, when hitherto some had come in trepidation when ill. I am reminded in this connection of an experience in a steel corporation. My predecessor, as physician to this corporation, told me that there was seldom a case of venereal disease among the several thousand employees and that the rule required elimination of the employee when such infection was detected. By adopting a sensible policy in helping the diseased individual to obtain

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treatment, and not causing him to lose time from work, dozens of such cases were soon under observation and the possibilities of dissemination of contagion lessened by giving proper instructions and treatment. We are faced with a similar situation when we endeavor to keep train service employees under medical observation. They will tend to report for examinations when they learn that their health is safeguarded and that their job will not be jeopardized. Safety of train operations is enhanced by a policy that brings to light most of the physical defects of the employees and by placing defective employees in less hazardous positions; and it is endangered by having most of these defects hidden when employees are discharged outright. Placement of defectives and their medical correction are two services that represent a square deal to labor.

## New York State Society

DR. CHARLES W. WOODALL, of Schenectady, was elected President of the New York State Society of Industrial Medicine for the coming year at the Fifteenth Annual Meeting of that organization held at Binghamton, N. Y. October 23.

Dr. Woodall succeeds Dr. Charles D. Squires, of Binghamton, through whose efforts a most interesting program was presented at the Binghamton meeting. The morning session was devoted to a discussion of the new all-inclusive occupational disease amendment and the medical practice act--a "free choice of doctor" statute—both of which were added to the New York State Workmen's Compensation Law at the 1935 session of the legislature. State Industrial Commissioner Elmer F. Andrews was present at the meeting and answered a barrage of questions relative to the administration of the new statutes. He explained that there are still many details to be ironed out before the new laws can be administered, but that these numerous difficulties were being overcome. He predicted that the new laws would work out favorably for the doctor, the employer and the employee.

Other speakers, who included Henry D. Sayer, a former industrial commissioner, and Oliver G. Browne, executive secretary of the Self-Insurers' Association, took issue with Commissioner Andrews on several points, declaring that there are inconsistencies in both measures which will have an effect contrary to that predicted by the present commissioner unless drastic revisions are made.

At a scientific session a large attendance heard interesting papers by Dr. William S. McCann, Rochester University School of Medicine, on "Respiratory Function in Pneumoconiosis", and by Dr. Clay Ray Murray, Associate Professor of Surgery, College of Physicians and Surgeons, Columbia University, on "The Time Element in Industrial Fractures—Its Influence on the Choice of Treatment Method".

Other officers elected were Dr. Willis C. Templer, Corning Glass Works, Corning, first vice-president; Dr. Edgar A. Vander Veer, New

York Central Railroad, Albany, second vice-president; Dr. Raymond C. Almy, Columbian Rope Co., Auburn, treasurer, and Frank E. Redmond, Buffalo, executive secretary. The next annual meeting will be held at Schenectady in the fall of 1936.

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## Hazards of Copper Plating

COULD there be any systemic effect from working in a copper plating department using the following formulas for copper plating steel: First solution, sodium cyanide, sodium bisulphite, sodium thiosulphate and caustic flakes. Cleaning solution, lump caustic, trisodium phosphate, soda ash and resin. Then sulphuric acid in 10 to 15 per cent solution used in pickling the iron. This solution gives off fumes which at times become very dense, like a vapor, and the workers feel that they have some effect on their lungs and stomach.*

Answer — In this situation it is probable that the sulphuric acid constitutes more of a practical hazard to systemic disease than any of the other agents specified. Sulphuric acid has the reputation of not evaporating; but, as a result of the countless numbers of bubbles produced in the chemical processes of metal pickling, much sulphuric acid may be thrust into the atmosphere of the plating or pickling room. These acid vapors are the source of irritation in the mouth, respiratory tract and along the gastro-intestinal tract. Gastritis and ulcers of the gastro-intestinal tract are believed to be of higher frequency among plating workers, galvanizers and picklers than is true for the general work population.

Second in importance is the sodium cyanide, which, however, is not so highly toxic as has long been the belief of both the medical profession and the public. Chronic poisoning by cyanogen compounds has been questioned but by others it has been associated with nausea, loss of appetite, gastro-intestinal dysfunctions and albuminuria. Acute and severe poisoning by cyanogen gases constitutes a definite disease entity characterized by impaired respiration, marked slowing of the heart rate, lowering of temperature, dilatation of the pupils and quick loss of consciousness, associated with cyanosis of the skin. In spite of extensive applications of cyanides in industry, cases of industrial poisoning are quite rare. On this account greater significance is attached to the sulphuric acid.

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## Respiratory Risks

BULLETIN No. 40 (April, 1935) of the Association of Casualty and Surety Executives comments:

"According to a statement in the **San Francisco Chronicle**, January 28th, attributed to C. W. Fellows, former manager of the State Compensation Insurance Fund, under the decision in the Marsh Case (217 Cal. 338) a man may be confined in a hospital as long as 20 years and then trace his trouble to a former occupation and levy a claim for silicosis against his long ago employer. And under another decision a man disabled with silicosis is entitled to hospital expenses, medical care, medicines and nursing, in addition to compensation payments, as long as he lives. If these rulings are permitted tc stand, many industrial risks will become uninsurable except at prohibitive rates."

And quotes: "In New York the plan of scheduling occupational diseases, when recognized as such, has long been established and these have been compensated as accidents. The main difficulty in opening the same door to a respiratory disease is . . . one of diagnosis. To open that door lets in most of the ordinary diseases of life and those brought on by the vices and incorrect habits of living of mankind, together with the infirmities of age. In doing so the compensation law becomes more than ever a scheme for relief as distinguished from a purpose to displace the old liability system with something more equitable, the original conception of a compensation law."

## Chile Silicosis

A MEDICO-SOCIAL study of "Silicosis in Chile" by four doctors of evident competence has just been published.* Therein it is recommended that: "Neumoconiosis" (pure or accompanied with tuberculosis) should be added to the schedule of occupational disease in the Chilean compensation law. The disease should be divided into three stages and the compensation for cases in the first stage should be limited to two years wages. Five years exposure should be required. (Literally, compensation payable only if the disease results more than five years after the employee "began" to work in industries susceptible of producing silicosis). The time limit for proof of injury should be five years after the last exposure. And initial and periodical examinations of and frequent "lay-offs" of workmen in occupations with hazards of the disease should be required.

## Drs. to N. Y. Industrial Council

DRS. WILLIAM D. JOHNSON, Batavia; Edward C. Podvin, and Horace E. Ayers, New York, and William Linder, Brooklyn, have been appointed by Gov. Lehman, to the New York State Industrial Council. They will represent physicians in their relation to the department of labor in matters concerning the new workmen's compensation law passed by the last legislature. Albert W. Bailey, D.O., Schenectady, was also appointed.

* *Caja de Seguro Obligatorio.*

*Original Publication in *Industrial Medicine.*